113231

Grasse River Activated Carbon Pilot Study

Construction Documentation Report

November 2007

Grasse River Study Area Massena, New York

ALCOA

113231

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Acknowledgements

This report, prepared on behalf of Alcoa Inc. (Alcoa), contains contributions from several companies. Technical direction and oversight of the 2006 Activated Carbon Pilot Study (ACPS) performed in the lower Grasse River, and oversight of the preparation of this report was provided by Alcoa.

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- Alcoa, Alcoa Center, Pennsylvania and Massena, New York
- Anchor Environmental, L.L.C., Andover, Massachusetts, and Seattle, Washington
- Blasland, Bouck & Lee, Inc. (BBL), now known as ARCADIS of New York, Inc. (ARCADIS BBL), Syracuse and Massena, New York, and Beverly, Massachusetts
- Camp Dresser & McKee Inc., Massena, New York
- J. F Brennan Company, La Crosse, Wisconsin
- Quantitative Environmental Analysis, LLC, Montvale, New Jersey
- Tetra Tech EC, Norcross, Georgia
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ACPS	Activated Carbon Pilot Study
Alcoa	Alcoa Inc.
Anchor	Anchor Environmental, L.L.C.
ARP	Alcoa Responsible Person
BBL	Blasland, Bouck & Lee, Inc., now known as ARCADIS of New York, Inc. (ARCADIS BBL)
BC-C	Black carbon-chemical pre-oxidation analytical method
BC-T	Black carbon-chemothermal pre-combustion analytical method
Brennan	J.F. Brennan Company
CAP	Community Advisory Panel
CDM	Camp Dresser & McKee, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Chadwick	GEI Consultants Inc./Chadwick Ecological Division
ChemLab	Alcoa Massena ChemLab
cfs	cubic feet per second
CMP	Coastal Management Program
CZCA	coastal zone consistency assessment
dBA	decibel
DGPS	differential global positioning system
DoD	Department of Defense
DO	dissolved oxygen
dynes/cm^2	dynes per square centimeter
ECN	Engineering Change Notice
EHS	Environmental Health and Safety
fps	feet per second
GPS	global positioning system
HASP	Health and Safety Plan
mg/L	milligrams per liter
NEA	Northeast Analytical, Inc.
NOAA	National Oceanic and Atmospheric Administration
NTU	Nephelometric turbidity unit
NYS	New York State

NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ORD	(USEPA) Office of Research and Development
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PEHSR	Project Environmental Health and Safety Review
POC	particulate organic carbon
ppm	parts per million
QA/QC	quality assurance/quality control
QEA	Quantitative Environmental Analysis, LLC
RBPs	Rapid Bioassessment Protocols
ROPS	Remedial Options Pilot Study
rpm	revolutions per minute
RTK	real-time kinematic
SLSDC	St. Lawrence Seaway Development Corporation
SPMD	semi-permeable membrane device
SRMT	St. Regis Mohawk Tribe
Stanford	Stanford University
T	Transect
TOC	total organic carbon
TSS	total suspended solids
TtEC	Tetra Tech EC
µg	microgram
µg/L	micrograms per liter
UMBC	University of Maryland, Baltimore County
USEPA	U.S. Environmental Protection Agency

EXECUTIVE SUMMARY

This Construction Documentation Report summarizes the implementation of the Activated Carbon Pilot Study (ACPS) in the lower Grasse River in Massena, New York. The ACPS was designed to evaluate a promising new technology for the remediation of sediments containing polychlorinated biphenyls (PCBs) in the lower Grasse River.

The technology implemented for this pilot study consists of the addition of activated carbon to the upper layer of the sediment bed. Recent laboratory and focused field studies conducted by Stanford University, University of Maryland Baltimore County (UMBC), and others have demonstrated that mixing activated carbon into surface sediments successfully sequesters PCBs, and is effective in reducing PCB bioaccumulation in benthic organisms and reducing release of bioavailable PCBs into the water column. The overall objective of the ACPS is to verify that the bioavailability of PCBs within lower Grasse River sediments can be effectively reduced at the field scale through the placement and mixing (by mechanical or natural processes) of activated carbon into surface sediments.

To achieve this objective, Alcoa implemented a pilot demonstration that began with laboratory studies and land-based equipment testing, continued with field-scale testing of alternative placement methods, and culminated in fall 2006 with a field demonstration of the most promising activated carbon application and mixing methods to a 0.5-acre pilot area within the lower Grasse River. Environmental monitoring activities were conducted prior to and during the in-river construction to evaluate the potential for water quality and other environmental impacts that may be associated with activated carbon placement and mixing operations. The ACPS includes a detailed 2-year post-implementation physicochemical and biological monitoring program to evaluate the longer-term effectiveness of the activated carbon treatment.

Based on the results of initial laboratory studies that evaluated bioavailability reductions achieved at different activated carbon doses, a target application concentration of 2.5 percent activated carbon (dry weight basis) was used in the Grasse River field demonstration. Three treatment options were implemented within the pilot study area; two that applied and actively mixed activated carbon into the surface sediments and one that placed activated carbon on the sediment surface (without mixing). Placement and mixing of the activated carbon into the surface sediments was achieved using two different devices: 1) a 7 x 12-foot enclosed device that first applied (sprayed) activated carbon onto the sediment surface, and then mixed the material into near-surface sediments using a roto-tiller type mechanical mixing unit; and 2) a 7 x 10-foot tine sled device that included direct injection of activated carbon into near-surface sediments. The third treatment option consisted of the application of activated carbon to the sediment surface using the tiller device, but with the mixing devices removed. Monitoring of this "unmixed" treatment area will be performed to evaluate the rate and extent of incorporation of the surficial layer of placed activated carbon into near-surface sediments over time through natural processes (e.g., bioturbation).

Sediment cores were collected immediately following the fall 2006 application of activated carbon, and samples were submitted for quick turn-around laboratory analyses to verify achievement of the target dose of activated carbon. While variability in baseline concentrations and analytical recovery procedures resulted in uncertainties associated with interpretation of individual total organic carbon (TOC) and black carbon-chemothermal pre-combustion (BC-T) measurements, respectively, a weight-of-evidence approach that used multiple comparisons was employed to inform real-time field decisions relative to the activated carbon application. Following completion of field activities, UMBC refined and improved a black carbon-chemical pre-oxidation (BC-C) method, resulting in a more accurate and precise procedure to confirm activated carbon concentrations in Grasse River sediments, relative to TOC and BC-T methods. Subsequently, archived baseline and post-application sediment samples were analyzed by UMBC using the confirmatory BC-C method, to determine with greater confidence the activated carbon dose achieved by the various application techniques.

General findings from the ACPS field demonstration, as detailed in the main body of the Construction Documentation Report, can be summarized as follows:

- Activated carbon was successfully applied to sediments in the Grasse River pilot area in a safe manner without any health and safety effects to site workers or the community.
- The confirmatory BC-C data validated the earlier field weight-of-evidence estimates.
- The overall average activated carbon dose achieved throughout all treatment areas ranged from 3.2 to 5.3 percent (based on BC-C analysis of 5-point composite samples), successfully exceeding the target dose of 2.5 percent.
- No measurable changes in water column PCBs were observed adjacent to or downstream of the ACPS area during activated carbon application. Turbidity levels

during the performance of the project never approached the action level of 25 nephelometric turbidity units (NTUs) above background. Water quality monitoring performed immediately adjacent to the ACPS area indicated that only a small increase in turbidity occurred during activated carbon application and/or mixing using the tine sled and tiller equipment. The levels measured downstream of the ACPS area were only slightly higher than those measured upstream (average turbidity and total suspended solids [TSS] increases of roughly 0.2 NTU and 0.8 mg/L, respectively), suggesting that the applications did not have a significant effect on downstream water quality.

- The water column monitoring data indicate that construction activities did not have a significant impact on water quality in the river, and suggest that the use of silt curtains to contain suspended solids and/or activated carbon is not necessary for future applications of activated carbon using the tine sled or tiller equipment.

The data also indicated that the application and mixing equipment used in this field demonstration resulted in spatial variability of the achieved activated carbon dose. While such variability could likely be reduced through additional design refinements of the application and mixing equipment, the spatial variability resulting from this pilot demonstration will continue to be monitored to evaluate the rate and extent of mixing over time through natural processes (e.g., bioturbation).

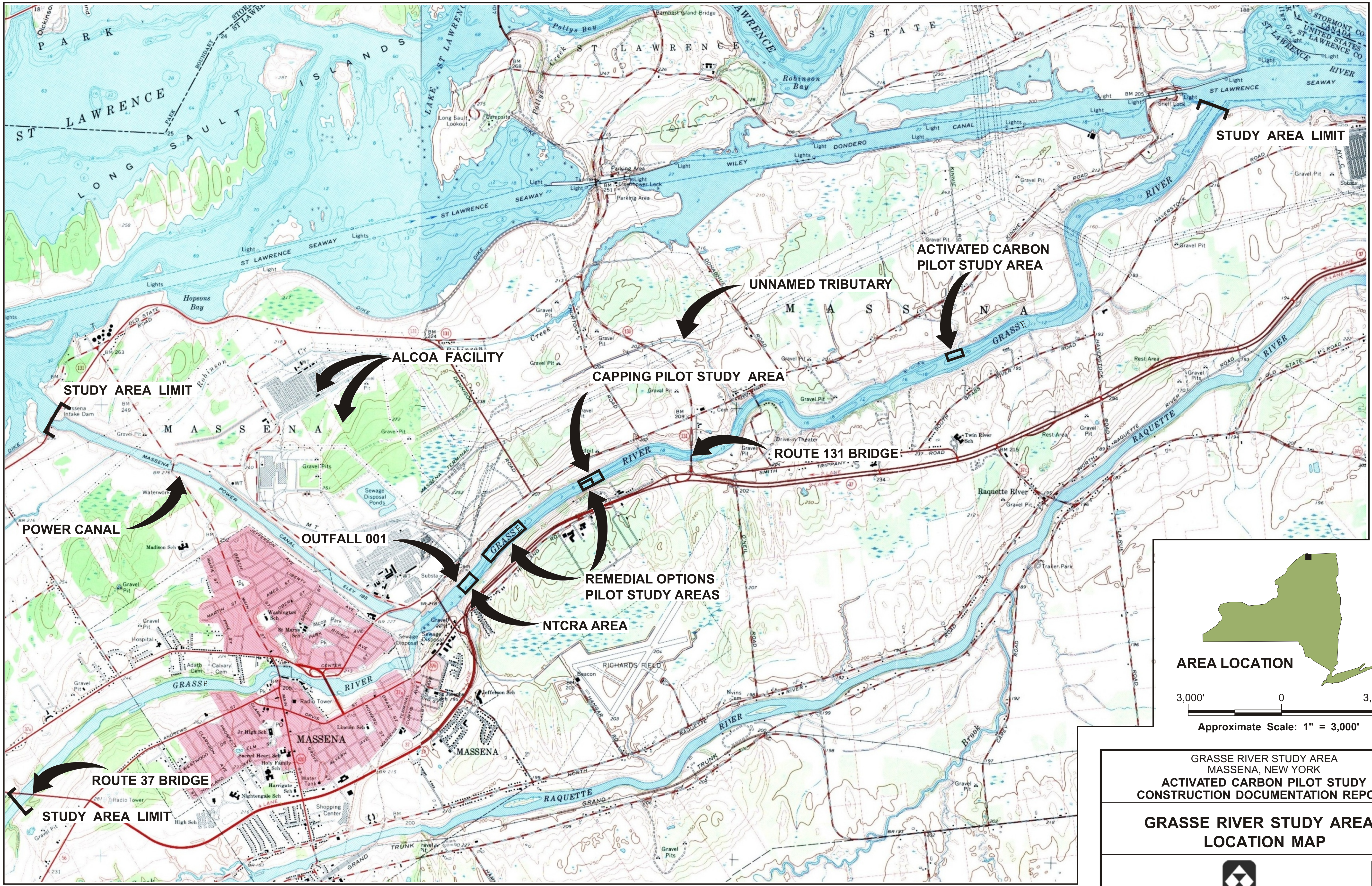
As discussed above, a detailed 2-year post-implementation physicochemical and biological monitoring program will be initiated to evaluate the effectiveness of the field demonstration. The results of this ongoing monitoring program will be presented in future ACPS reports. Ultimately, results of the project will be incorporated into the evaluation (e.g., modeling) framework that has been developed for the lower Grasse River to determine the potential for system-wide bioavailability reductions associated with larger-scale application of this technology in the lower Grasse River as part of the revised Analysis of Alternatives Report for the site.

1 INTRODUCTION

This Construction Documentation Report describes the activities performed as part of the 2006 Activated Carbon Pilot Study (ACPS) conducted by Alcoa Inc. (Alcoa) within the lower Grasse River in Massena, New York (Figure 1-1). The ACPS was designed to evaluate a new technology for the remediation of sediments containing polychlorinated biphenyls (PCBs) in the lower Grasse River.

The overall objective of the ACPS is to verify that the bioavailability of PCBs within the lower Grasse River sediments can be effectively reduced at the field scale level through the addition of activated carbon which, in turn, is expected to sequester PCBs within the sediment and result in the reduction of PCB levels in both the water column and fish of the lower Grasse River. To achieve this objective, Alcoa implemented a two-phased pilot demonstration that began with laboratory studies and land-based equipment testing (Phase 1), continued with field-scale testing of alternative placement methods, and culminated in fall 2006 with a field demonstration of several activated carbon application and mixing methods (Phase 2). Prior to and during this construction period, environmental monitoring activities were conducted to evaluate potential water quality and other impacts that may be associated with activated carbon placement and mixing operations. Alcoa will conduct a 2-year post-activated carbon application physicochemical and biological evaluation to assess and verify the effectiveness of the treatment.

Ultimately, results of the project will be incorporated into the evaluation (e.g., modeling) framework that has been developed for the lower Grasse River to determine the potential for system-wide bioavailability reductions associated with larger-scale application of this technology in the lower Grasse River. Activated carbon placement could potentially be designed to directly address key PCB bioaccumulation risk issues identified within the lower Grasse River, building on encouraging laboratory studies performed on sediments collected from the Grasse River and other similar sites, as summarized in the ACPS Work Plan (Alcoa 2006b). Placement of activated carbon in the lower Grasse River has the potential to be less disruptive to the benthic environment than some alternative remediation approaches. There may also be significant cost advantages in using this technology, compared with other available remedial options.



GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
ACTIVATED CARBON PILOT STUDY
CONSTRUCTION DOCUMENTATION REPORT

GRASSE RIVER STUDY AREA - LOCATION MAP

ALCOA

FIGURE
1-1

11/14/06 SYR-D85-DJH
10811001/10811n01.cdr

REFERENCE: MASSENA, NEW YORK-ONTARIO USGS QUAD. 1964 RAQUETTE RIVER, NEW YORK-ONTARIO USGS QUAD. 1964

1.1 Background

The lower Grasse River is currently under a fish consumption advisory from the New York State Department of Health (NYSDOH) due to elevated PCB levels found in fish (NYSDOH 2006). Results of site investigation work conducted to date indicate that the major source of PCBs to the fish is from sediments in the river, which have been impacted by past discharges (Alcoa 2001). The technology implemented for this pilot study consists of the addition of activated carbon to the upper layer of the sediment bed. Recent laboratory studies by Ghosh, Luthy, and others have demonstrated that this technology is effective in reducing PCB bioaccumulation in benthic organisms, PCB release into the water column, and PCB uptake by semi-permeable membrane devices (SPMDs). Laboratory work with sediment from the lower Grasse River has shown that adding 2.5 percent activated carbon (by weight) reduced PCB uptake in the freshwater clam *Corbicula fluminea* by 95 percent (McLeod et al. in press 2007) and in the freshwater oligochaete *Lumbriculus variegatus* by 93 percent (Sun and Ghosh 2005). These studies, as well as others related to the use of activated carbon to reduce PCB bioavailability, are further detailed in the ACPS Work Plan (Alcoa 2006b). As shown on Figure 1-2, adding 2.5 percent activated carbon to the Grasse River sediments in the laboratory resulted in the largest reduction in PCB bioaccumulation compared to untreated sediment. However, significant reductions were also observed for smaller doses of activated carbon, with 86 and 67 percent reductions for 1.3 and 0.7 percent activated carbon doses, respectively.

Based on these results, the addition of activated carbon to sediments in the lower Grasse River has the potential to achieve significant reductions in PCB mobility and bioavailability in the treated in situ sediments. This, in turn, is expected to result in corresponding reductions of PCB levels in both the water column and fish of the lower Grasse River.

1.2 Study Objectives

The Final Work Plan approved by U.S. Environmental Protection Agency (USEPA) for this study (Alcoa 2006b) identified the following study objectives:

1. Evaluate the ability to deliver activated carbon into in-place sediments and determine the extent to which PCBs and sediments are released to the river during application.
2. Measure the change in PCB bioavailability to deposit-feeding benthic organisms that results from activated carbon amendment.

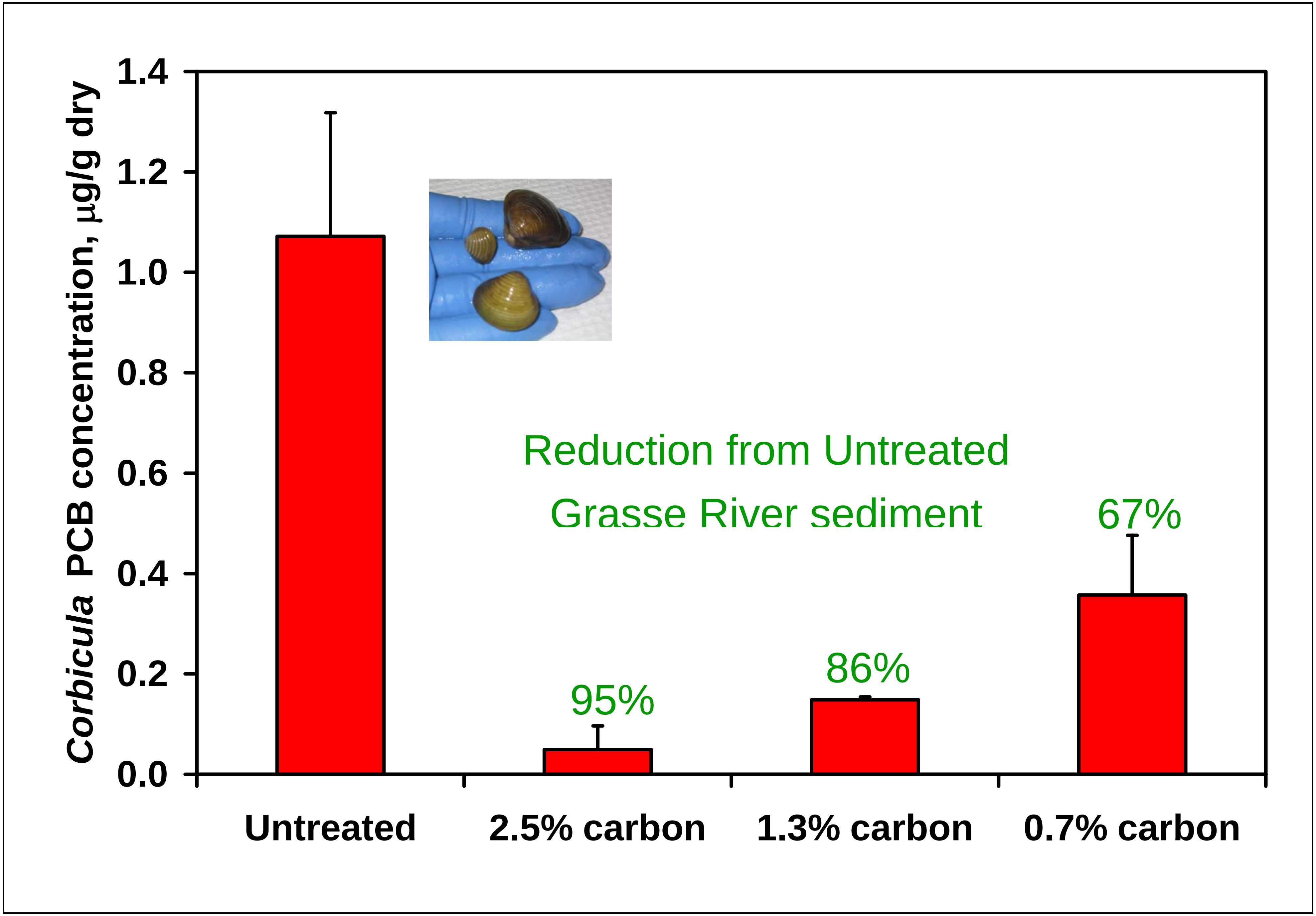


Figure 1-2
Grasse River Bioaccumulation Study Results

3. Evaluate changes in PCB desorption kinetics and equilibrium partitioning from sediments that result from activated carbon amendment.
4. Evaluate whether the erosion potential of the sediments is altered by activated carbon amendment.
5. Evaluate changes to the benthic community, if any, as a result of this in situ treatment application.

To achieve these objectives, Alcoa conducted the following activities:

- Performed laboratory testing to evaluate the efficacy of this technology specifically for use on the Grasse River
- Designed and fabricated equipment especially for the application of activated carbon to Grasse River sediments
- Conducted site-specific baseline monitoring activities
- Applied activated carbon to surface sediments in a 0.5-acre area in the Grasse River
- Monitored noise, water quality, and sediments during activated carbon application

In addition to the activities performed to date, Alcoa will conduct a longer term physicochemical and biological monitoring program, as discussed in detail in Section 5.

1.3 Study Design

The ACPS was conducted in two phases: Phase 1 – off-site land-based testing of various application and mixing techniques; and Phase 2 – in-river application and mixing of activated carbon to sediments in a 0.5-acre portion of the lower Grasse River using the most effective application and mixing technique or techniques, as determined during the land-based testing. In addition, a 2-year post-treatment physicochemical and biological assessment is planned to assess the effectiveness of the activated carbon addition in reducing the bioavailability of PCBs in the treated sediments. The decision to extend the physicochemical and biological assessments to a third year will be based upon the results of the monitoring conducted over the first 2 years.

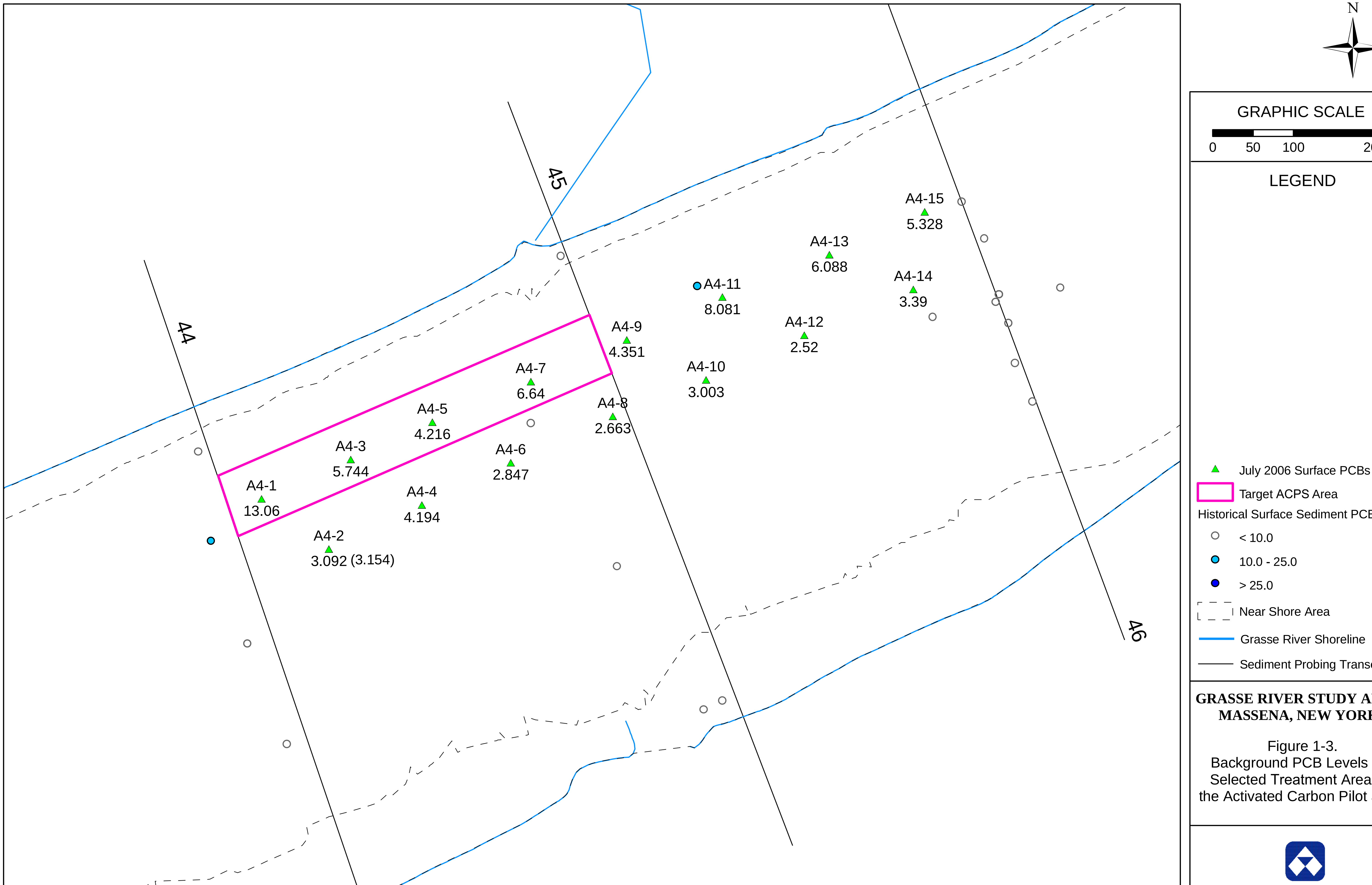
1.3.1 Site Selection

The original plan was to conduct the ACPS in a shallow, nearshore area of the river (i.e., an area with water depths less than 5 feet) with surface sediment PCB concentrations generally in the 10 to 50 parts per million (ppm) range. However, sediment samples collected from several targeted nearshore areas of the river in 2006 contained PCB levels that were relatively low (i.e., less than 5 ppm) and often below the detection limit. For this reason, sampling from several areas within the main channel of the river was conducted in June and July 2006 to identify a deeper water location with surface sediment PCB concentrations greater than 5 ppm. The PCB results from this sampling effort, along with the physical characteristics of each respective candidate area, were evaluated and discussed with the Agencies (see Section 1.4) in July 2006, and served as the basis for the selection of the ACPS area.

The selected ACPS area consists of an approximately 75 feet wide by 500 feet long area (0.9 acres) situated along the northern portion of the main channel of the river between sediment probing Transect (T)44 and T45, approximately 3.5 miles downstream of Outfall 001 (Figure 1-3). As described in the Work Plan (Alcoa 2006b), this area was initially subdivided into three sub-areas (covering 0.5 acres of the 0.9-acre ACPS area) for in-river testing and activated carbon application. As described in Section 3, the ACPS area was subsequently re-divided into four sub-areas (covering the same 0.5 acres) to accommodate additional activated carbon testing (Figure 1-4). The T44-T45 ACPS area was selected for the following reasons:

- Surface sediment PCB concentrations in this area are generally within the target range (greater than 5 ppm).
- The study area is situated within a contiguous fine sediment deposit, which reduced the potential for encountering rocks, boulders, and other obstacles that are often found close to the sediment surface in coarse sediment deposits within the lower Grasse River.
- The river is relatively wide in this area, which allowed less of the river cross-section to be closed to navigation from silt curtain deployment.
- The river bottom is relatively flat, which simplified placement and mixing operations during the study.

It should be noted that a number of the site selection criteria (flat bottom, limited chance for obstructions) were incorporated into the study design based on the recognition that this was the first time that the technology was being deployed in a deeper water environment and the first time that the equipment developed for the project was being tested in an actual field application. The equipment design and testing conducted during the Phase 1 land based efforts did incorporate capabilities to address bottom obstructions in the river and the equipment is also expected to be functional on mild to moderate bottom slopes.



GRAPHIC SCALE

Feet
0 50 100 200

LEGEND

July 2006 Surface PCBs (ppm)

Target ACPS Area

Historical Surface Sediment PCBs (ppm)

< 10.0

10.0 - 25.0

> 25.0

Near Shore Area

Grasse River Shoreline

Sediment Probing Transects

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

Figure 1-3.
Background PCB Levels and Selected Treatment Area for the Activated Carbon Pilot Study

ALCOA

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The selected ACPS area is situated in about 15 to 17 feet of water and has a relatively flat river bottom. Sediments in this area are primarily composed of silt, fine sand, and trace organics. Probing measurements of sediment thickness from this area in 2006 indicated that about 1.2 to 4.4 feet of relatively soft sediment overlie harder substrate in this area.

Sediment core samples were collected from the general T44-T45 area during June/July 2006. Four of the 15 samples in this reach of the river were located within the ACPS area: A4-1, A4-3, A4-5, and A4-7 (see Figure 1-3). The surface (i.e., top 3 inches) sediments in these cores contained 13.1, 5.7, 4.2, and 6.6 ppm dry weight PCBs, respectively. The other 11 samples collected in 2006 within the vicinity of the ACPS area contained surface PCB concentrations ranging between 2.5 to 8.1 ppm. Surface sediment samples collected historically (1991 to 2004) from this general area contained similar PCB concentrations (0.7 to 14.3 ppm; Alcoa 2001, 2004, 2005). The physical and chemical properties of the surface sediments collected from this general area are presented in Table 1-1.

1.3.2 Study Components

As described in Section 1.3.1, the ACPS area was divided into four sub-areas (comprising a total of about 0.5 acres) during implementation, as shown on (Figure 1-4):

- Initial Testing Area: approximately 50 feet by 100 feet
- Mixed Tiller Treatment Area: approximately 75 feet by 150 feet
- Tine Sled Mixed Treatment Area: approximately 60 feet by 50 feet
- Unmixed Tiller Treatment Area: approximately 50 feet by 50 feet

These sub-areas were separated by buffer zones (in which no activated carbon was placed) to reduce the potential for overlap between treatments.

The pilot study was conducted in two phases. Phase 1 focused on design, fabrication, and testing of various application and mixing techniques in a controlled upland (e.g., tank) setting at J.F. Brennan Company's (Brennan's) facility in La Crosse, Wisconsin.

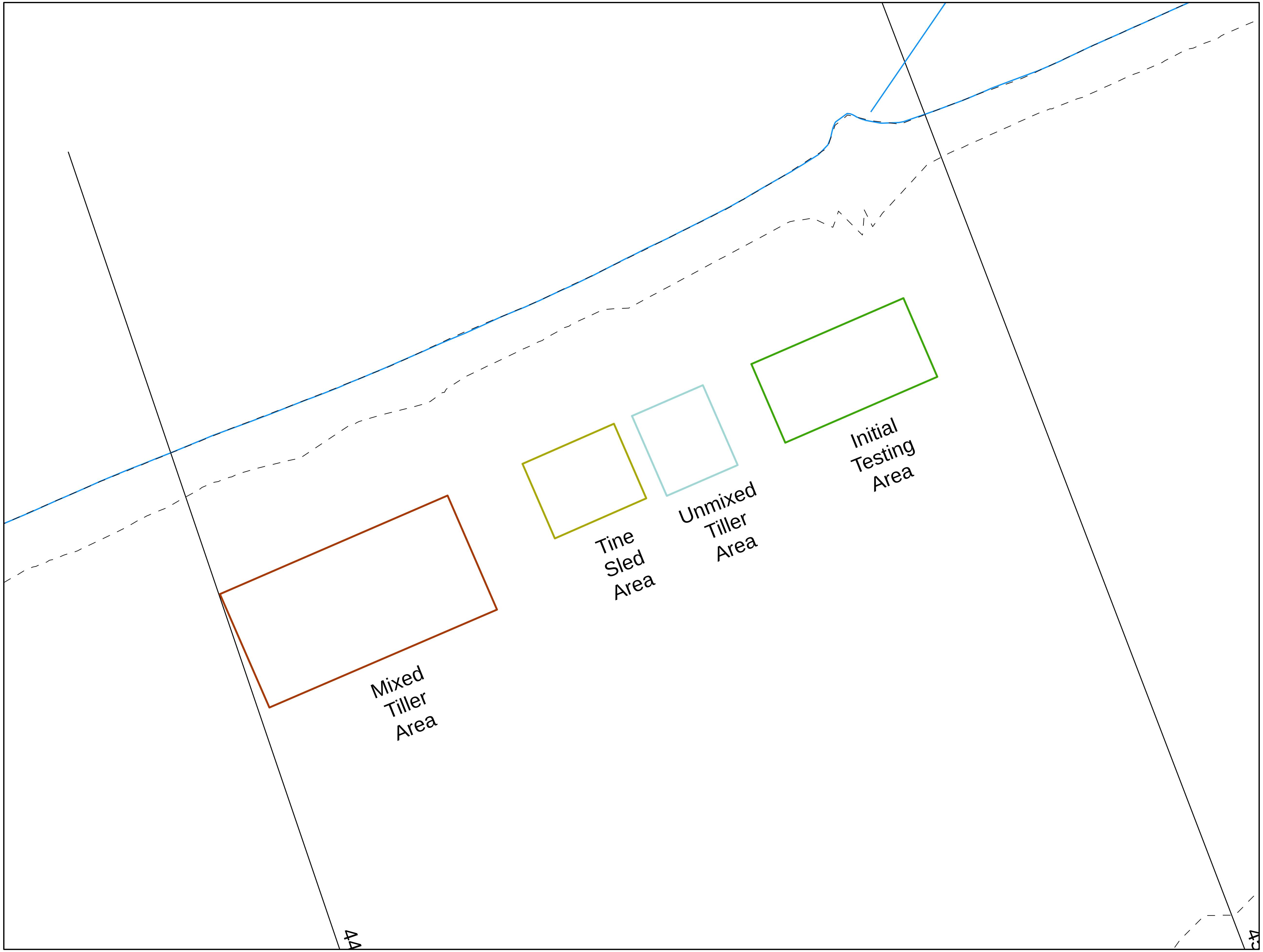
Table 1-1
Physical and Chemical Properties of Surface Sediments in Vicinity of the Activated Carbon Pilot Study Area

Collection Year	Sample ID	Surface[1] Sediment PCBs (ppm)	Total Organic Carbon (%)	Dry Density (g/cm^3)	Solids Content (%)
1991	S-R7-B01	14.30	6.4	---	---
	S-R7-T2-L1	7.20	5.3	---	---
	S-R7-T2-L2	5.80	6.0	---	---
	S-R7-T2-L3	3.77	5.5	---	---
2001	V-48	7.24	4.0	---	33.1
2003	SED-T44-SSN	0.70	1.7	0.75	58.7
	SED-T44-N	10.01	5.4	0.29	28.4
	SED-T44-M[2]	3.29	4.9	0.34	28.8
	SED-T44-S	3.91	4.4	0.33	32.9
	SED-T46-N	5.59	5.9	0.32	29.0
	SED-T46-M[2]	3.54	6.1	0.34	31.4
	SED-T46-S	4.43	4.8	0.31	30.3
2004	SED-T46-MA[2]	5.24	7.2	0.32	28.4
	SED-T46-MB	4.58	3.7	0.37	33.8
	SED-T46-MC	4.03	4.9	0.30	30.7
	SED-T46-MD	5.59	4.7	0.33	33.0
	SED-T46-ME	5.58	5.0	0.35	34.1
2006	A4-1	13.06	---	---	---
	A4-2	3.09	---	---	---
	A4-3	5.74	---	---	---
	A4-4	4.19	---	---	---
	A4-5	4.22	---	---	---
	A4-6	2.85	---	---	---
	A4-7	6.64	---	---	---
	A4-8	2.66	---	---	---
	A4-9	4.35	---	---	---
	A4-10	3.00	---	---	---
	A4-11	8.08	---	---	---
	A4-12	2.52	---	---	---
	A4-13	6.09	---	---	---
	A4-14	3.39	---	---	---
	A4-15	5.33	---	---	---

Notes:

1. Surface sediments are defined as the top 3 inches of sediment column.
2. Values represent an average of the top 8 centimeters of sediment column.

PCB - polychlorinated biphenyl
ppm - parts per million
% - percent
g/cm^3 - grams per cubic centimeter
- - - - not measured



N

GRAPHIC SCALE

Feet

0 25 50 100

LEGEND

ACPS Treatment Areas

Initial Testing Area

Mixed Tiller Treatment Area

Tine Sled Mixed Treatment Area

Unmixed Tiller Treatment Area

Near Shore Area

Grasse River Shoreline

Sediment Probing Transects

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

Figure 1-4.
ACPS Treatment Areas

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Phase 2 consisted of initial in-river testing of the application and mixing techniques that proved most successful during the initial upland trials, followed by full-scale application of activated carbon to the river sediment. The in-river phase of the pilot program consisted of three components:

1. Final equipment testing and refinement of operating procedures were performed in the Initial Testing Area. Each piece of equipment was tested and sediment samples were collected to evaluate performance relative to the project objectives.
2. Activated carbon was applied and mixed into the surface sediments in the Mixed Tiller and Tine Sled Mixed Treatment Areas. Activated carbon was applied but not mixed into the sediments in the Unmixed Tiller Treatment Area; this portion of the study area will be used to evaluate the incorporation of the added activated carbon into the native sediments through natural processes (e.g., bioturbation). Although the objective of the ACPS was to treat the biologically active zone of the sediments (i.e., the top 3 inches), the vertical control tolerances of the application techniques were such that mixing to a depth of up to six inches was anticipated. Therefore, a post-application concentration (or "dose") of 2.5 percent activated carbon (dry weight basis) in the top 6 inches of sediment was targeted for the mixed and unmixed treatment areas. Details regarding the application of activated carbon to the river sediments are presented in Section 3.
3. In-field monitoring prior to, during, and after application included water column sampling (during), sediment sampling (pre, during, and post), benthic community and aquatic habitat assessments (pre and post), field PCB biouptake studies (pre and post), and sediment erosion potential testing (pre and post). Details regarding the in-field monitoring activities are presented in Sections 2.3, 3.4, and Appendix A. At the time this ACPS report was prepared, baseline PCB desorption rates, aqueous equilibrium, and benthic invertebrate uptake rates were being conducted by University of Maryland Baltimore County (UMBC). These baseline data, along with the results of Year 1 post-application monitoring activities, will be documented in future submittals.

1.4 Project Team

Numerous entities participated in the development and implementation of the ACPS. The general responsibilities of each organization are presented below, and the pilot study organization chart is included as Figure 1-5.

- Agencies – Provided regulatory oversight throughout the ACPS. USEPA served as the lead oversight agency. In addition, representatives from the St. Regis Mohawk Tribe (SRMT), the New York State Department of Environmental Conservation (NYSDEC), National Oceanic and Atmospheric Administration (NOAA), USEPA Office of Research and Development (ORD), USEPA Environmental Response Team, U.S. Army Corps of Engineers Research and Development Center, and NYSDOH also participated through document reviews, meeting participation, and periodic site visits.
- Alcoa – Responsible for the overall management of the pilot study activities including construction, monitoring, and coordination with the Agencies. All organizations involved in the implementation of ACPS activities (e.g., construction, monitoring, and data management) reported directly to Alcoa. In addition, the Alcoa Massena ChemLab (ChemLab) was responsible for analysis of water column samples collected during implementation. Northeast Analytical, Inc. (NEA) contracted directly with Alcoa and was responsible for laboratory analyses of the sediment samples collected prior to and during implementation.
- Anchor Environmental, L.L.C. (Anchor) – Served as the technical and construction manager for the ACPS.
- Blasland, Bouck & Lee, Inc. (BBL), now known as ARCADIS of New York, Inc. (ARCADIS BBL) – Served as the project field engineer throughout construction and conducted environmental monitoring activities.
- J.F. Brennan – Subcontractor to TtEC with responsibility for the marine construction activities associated with the project.
- Camp Dresser & McKee, Inc. (CDM) – Responsible for Environmental Health and Safety (EHS) and served as the Alcoa Responsible Person (ARP) for safety oversight.
- Earth Tech Company – Served as USEPA's oversight contractor and was present on site for the duration of the ACPS.
- Quantitative Environmental Analysis, LLC (QEA) – Responsible for data compilation, management, and interpretation.
- Tetra Tech EC (TtEC) – Prime contractor with overall responsibility for implementing the construction of the ACPS.
- UMBC – Served as technical consultant throughout the ACPS.
- Stanford University (Stanford) – Served as technical consultant throughout the ACPS.

Grasse River ACPS
Project Organizational Chart

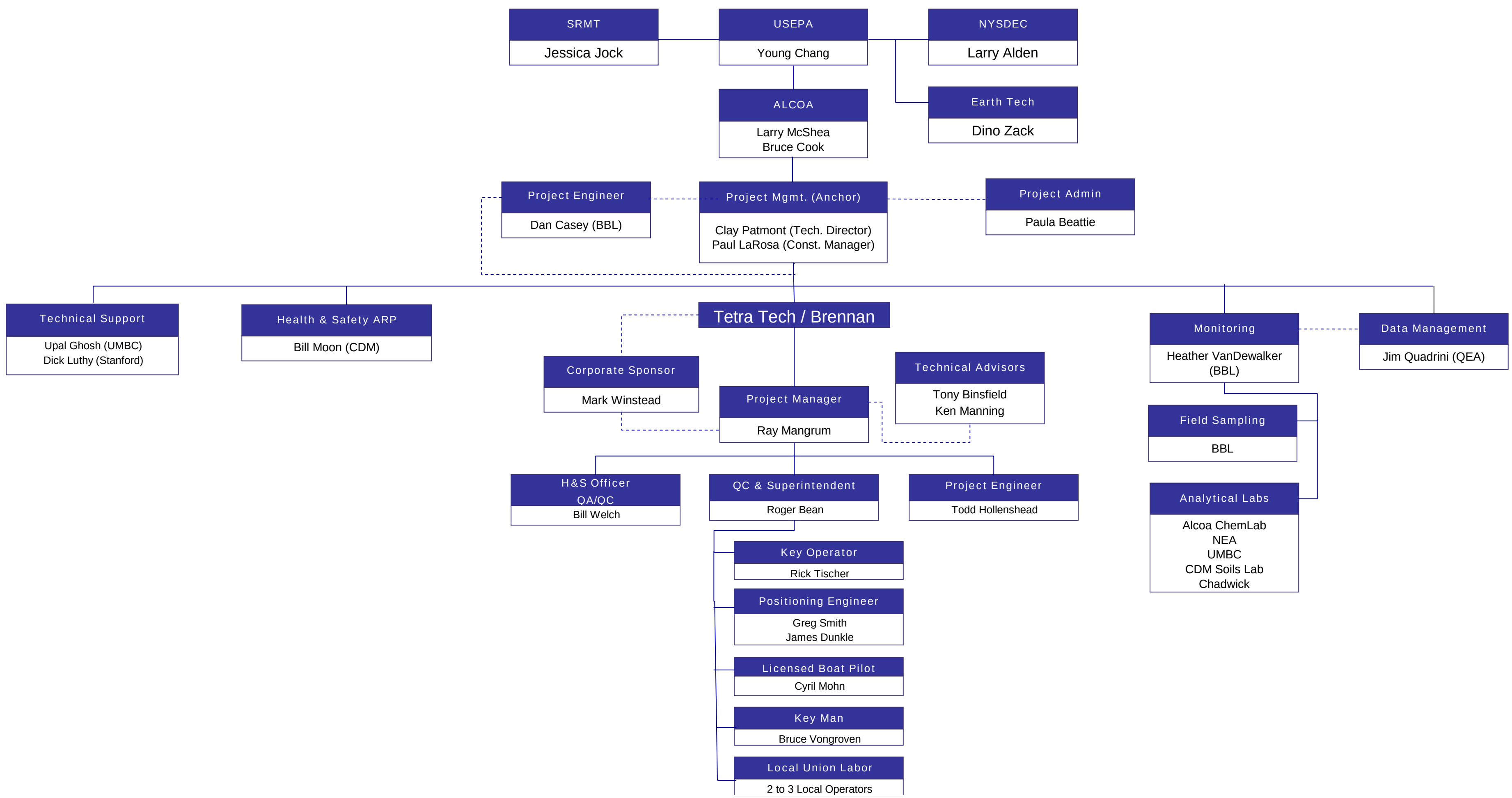

Figure 1-5
Project Organizational Chart

1.5 Environmental Health and Safety

Safety and environmental compliance were critical considerations in the design and implementation of the ACPS. Each project component was developed to provide for the health and safety of personnel involved with construction and monitoring activities, and to maintain adequate protection of the community and surrounding environment (see Section 1.7.1 for community health and safety measures). All health and safety components were developed consistent with applicable Occupational Safety and Health Administration (OSHA) regulations, Alcoa's EHS standards and requirements, and the corporate health and safety programs of each organization on the ACPS team. Throughout the ACPS, safety was maintained as the highest priority.

ACPS-specific safety and environmental compliance measures were continually reinforced with site personnel throughout the project planning and implementation stages. Key elements of the EHS program included project planning and the identification and assessment of hazards and control measures associated with activities to be performed as part of the ACPS. Safety and environmental compliance were reinforced and maintained throughout the ACPS through institution of the following practices:

- Health and Safety Plans (HASPs) specific to construction (TtEC 2006) and monitoring activities (BBL 2006).
- Task-specific Alcoa Project Environmental Health and Safety Reviews (PEHSRs) and follow-through on identified punch list action items.
- Site orientation training for all personnel and visitors on site.
- Daily morning safety meetings for all site workers and weekly ACPS safety team meetings.
- Self audits of ACPS operations, as well as an audit by an Alcoa safety professional.
- A safety action items list was maintained to track and follow-through on identified safety-related items that would require correction or implementation.

The ACPS was successfully completed with zero health and safety incidents and zero environmental non-compliance incidents.

1.6 Permit Equivalency

ACPS activities were conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and were subject to the permit exclusion of CERCLA Section 121(e). As requested by USEPA, Alcoa conducted a permit equivalency evaluation consisting of a coastal resources and floodplain assessment (Alcoa 2006a), which is outlined below.

1.6.1 Coastal Resources Assessment

The New York State (NYS) designated coastal zone extends from the confluence of the Grasse and St. Lawrence Rivers upstream beyond the Alcoa Bridge, and; therefore, the ACPS area was covered by the NYS Coastal Management Program (CMP). As such, a Federal Consistency Assessment Form and coastal zone consistency assessment (CZCA) were completed. These assessments included a discussion of the site location/setting, site history, proposed remedial action, and consistency of the proposed remedial action with the applicable NYS CMP policies as dictated by completion of the Federal Consistency Assessment Form. Based on the completed assessment, activities proposed as part of the ACPS were determined by USEPA to be consistent with the NYS CMP.

1.6.2 Floodplains Assessment

Since the ACPS took place within the designated 100- and 500-year floodplain, a floodplain assessment was developed that included: a description of the proposed action, the effects of the proposed action on the floodplain, a discussion of the impacts of the ACPS as compared to other options, and measures to mitigate potential harm to the floodplain if there is no practicable alternative to locating in or affecting the floodplain, including impacts to the ACPS from flooding events. Following USEPA's determination of negligible impacts to the floodplain from implementation of the ACPS, no additional assessments were required and no measures to mitigate potential harm to the floodplain were necessary.

1.7 Community Relations

Alcoa, working in coordination with USEPA, initiated and maintained a community relations program for the Grasse River project to keep the local community informed about the status of site work, provide opportunities for community members to ask questions about current and future activities, and gather feedback from interested parties related to the project. To this end, Alcoa held public meetings and availability sessions, developed community updates and fact sheets, formed the Community Advisory Panel (CAP), and posted information on the project website (www.thegrasseriver.com). Each of these forums allowed for community members to interact with Alcoa and obtain information regarding river studies, including the ACPS.

Community relations activities conducted in support of the ACPS included two CAP meetings, a Grasse River site tour, and a mass mailing of a community update and fact sheet. In early September 2006, Alcoa (in conjunction with USEPA) sent a mass mailing to residents of Massena and the surrounding communities. This mailing included a Superfund Program Update on the Remedial Options Pilot Study (ROPS) conducted in 2005, along with a summary of the ACPS (see Appendix B). This information was also posted on the Grasse River project website. In addition, Alcoa hosted a CAP group meeting and tours of the ACPS project site for the CAP group and the St. Lawrence River Remedial Action Committee on September 27, 2006. Community relations activities are ongoing.

1.7.1 Community Health and Safety

As outlined in the ACPS community mailer (Appendix B), Alcoa implemented several measures to proactively address community health and safety during the ACPS. Monitoring measures included water quality and noise monitoring (detailed in Section 3.4 and Appendix A). Results of these monitoring efforts indicated no issues associated with the ACPS. In addition, Alcoa posted lighted warning buoys and signs marking the extent of the ACPS in-river area. Security personnel monitored the ACPS area during non-active work hours to mitigate trespassing, vandalism, or accidental entry to the site. Since site mobilization and demobilization activities included transport of heavy loads through a residential area (i.e., Massena Center), Alcoa took precautions by: coordinating with the school superintendent to provide notification regarding affected school bus routes; requiring strict adherence by the project team (including delivery trucks) to reduced speed limits; and escorting delivery loads through this area near possible low overhead utility lines. No community issues were identified during implementation of the ACPS.

2 PRE-CONSTRUCTION ACTIVITIES

Pre-construction activities included land-based testing activities conducted as part of Phase 1 (see Section 1.3) as well as Phase 2 activities conducted prior to in-water construction including a bathymetric survey and baseline monitoring activities.

2.1 Land-based Testing Activities

As part of Phase 1 of this study, Alcoa and its consultants designed and fabricated equipment especially for the application of activated carbon to the Grasse River sediments.

2.1.1 Equipment Design, Fabrication, and Testing

Equipment was designed to place activated carbon on top of or incorporated within sediment in the Grasse River, with the goal of achieving a post-application activated carbon concentration of approximately 2.5 percent (dry weight basis) in the top 6 inches of sediment without exceeding water quality criteria. As such, equipment design, fabrication, and testing focused on these objectives. The equipment design was an iterative process through which refinements were made based on input from Alcoa's team during equipment development. Initial testing of the performance of various application and mixing equipment was conducted in controlled test tanks at the Brennan facility in La Crosse, Wisconsin, and culminated in a land-based demonstration of candidate techniques with USEPA on August 15, 2006. Following application of activated carbon as part of the Phase 1 land-based demonstration, sediment core samples (3-inch diameter) were collected from the test tanks and submitted to NEA for total organic carbon (TOC), percent moisture, and bulk density analyses to evaluate the effectiveness of the equipment in achieving the desired dose of activated carbon (2.5 percent by dry weight in the top 6 inches). Following a review of the data, additional larger volume samples (12-inch square surface area) were collected and submitted for TOC, percent moisture, and bulk density analyses to evaluate the spatial variability inherent in the application. Additional details and results of the Phase 1 sampling program are provided in technical memoranda submitted to USEPA (Alcoa 2006c and 2006d) and included herein as Appendix C.

Based on the results of the Phase 1 design and testing, the most effective application and mixing techniques were the roto-tiller (herein referred to as "tiller") and the tine sled equipment. The tiller and tine sled equipment are described in detail below and depicted on Figures 2-1 and 2-2. Appendix D also contains several photos of the equipment.

2.1.1.1 Tiller Design and Fabrication

The tiller was an approximately 7-foot by 12-foot steel box that contained rotating shafts with the ability to apply and mix activated carbon into the sediments (the tiller could also be used in an unmixed application by removing and/or not rotating the shafts). Specifically, the tiller equipment consisted of five parallel rotating shafts, each with numerous 0.75-inch-thick wire rope blades extending approximately 12 inches out from the shaft (Figure 2-1 and Appendix D). The wire rope blades extended 4 to 6 inches below the bottom of the steel enclosure and were rigid enough to penetrate into the bottom sediments, but flexible enough to pass over obstructions on the river bottom. The tiller was covered by a rigid enclosing shroud (inside dimension of 7 feet by 12 feet; footprint area of 84 square feet) to minimize the potential for resuspended sediment and activated carbon to be transported away from the placement area during mixing (Figure 2-1).

The activated carbon distribution system, consisting of 25 individual spray nozzles, was designed to deliver the activated carbon slurry within the enclosure just above the tiller blades (see photos in Appendix D). This equipment could also be used to place the activated carbon on the sediment surface without mixing by disengaging or removing the tiller assembly (see photos in Appendix D).

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Figure 2-1
Tiller Equipment

2.1.1.2 Tine Sled Design and Fabrication

The tine sled was an approximately 7-foot by 10-foot steel frame ("sled") with tines protruding below the base that was towed along the river bottom (Figure 2-2). Specifically, the tine sled consisted of two rows of injection tines and two rows of mixing tines attached to a sled. The two rows of injection tines (43 in total) were positioned near the front of the sled and angled back at approximately 30 degrees from vertical (see photos in Appendix D). One of these two rows of injection tines was designed to extend approximately 4 inches below the base of the sled; the second row was designed to extend 2 inches below the base of the sled. Both rows of injection tines were equipped with activated carbon injection nozzles mounted on the trailing edge of each tine. Each of these injection tines was able to rotate to nearly horizontal, opposite the direction of travel and independent of the other tines, so that the tines could pass over debris or other obstructions encountered within their path without affecting the performance of the other tines. After passing over an obstacle, the tines were designed to rotate back to their original orientation. Two additional rows of spring-loaded vertical mixing tines (without injection nozzles) were positioned behind the injection tines and extended approximately 6 inches below the base of the sled, providing additional mixing of the activated carbon with the existing sediments.

Two interchangeable enclosing shrouds were fabricated to enclose the tine sled and to help prevent transport of resuspended sediment or activated carbon. One was a rigid (steel) enclosure and the second was constructed of a flexible geotextile fabric. Photos of the tine sled with each enclosing shroud are included in Appendix D.

Figure 2-2
Tine Sled Equipment

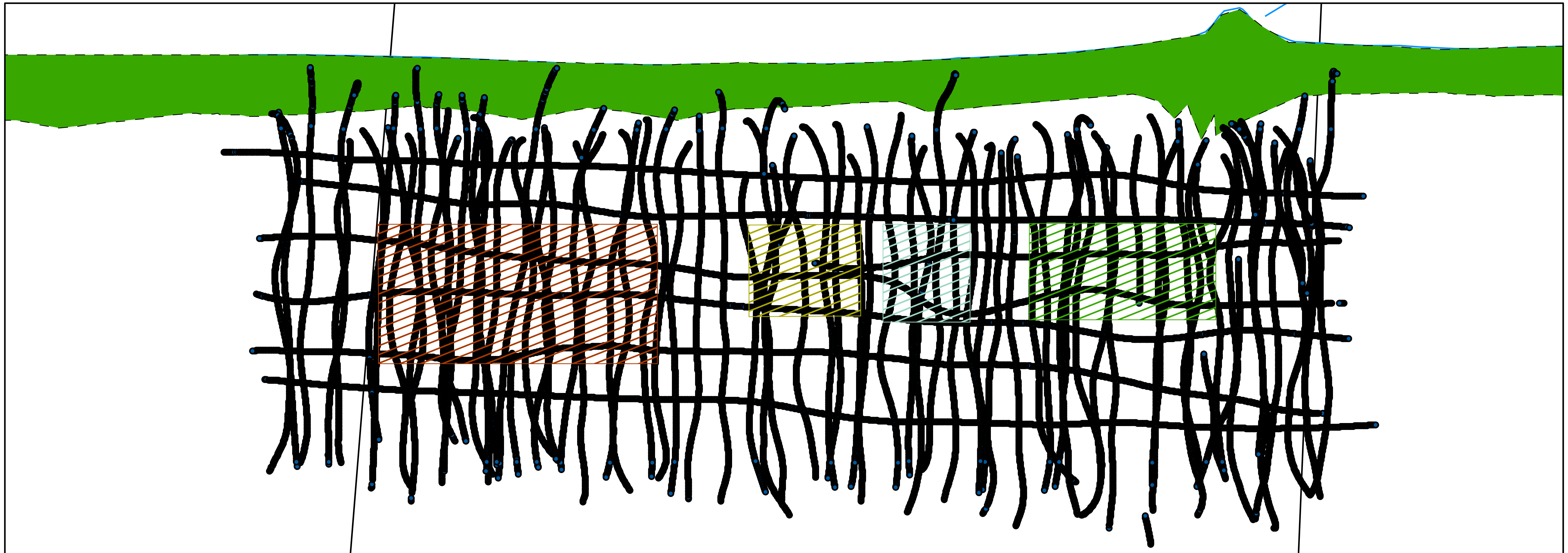
2.1.1.3 Other Valuable Information Gained from Phase 1 Land-Based Testing

As part of the equipment selection and design, the initial Phase 1 testing yielded valuable information on several aspects of activated carbon application. These included:

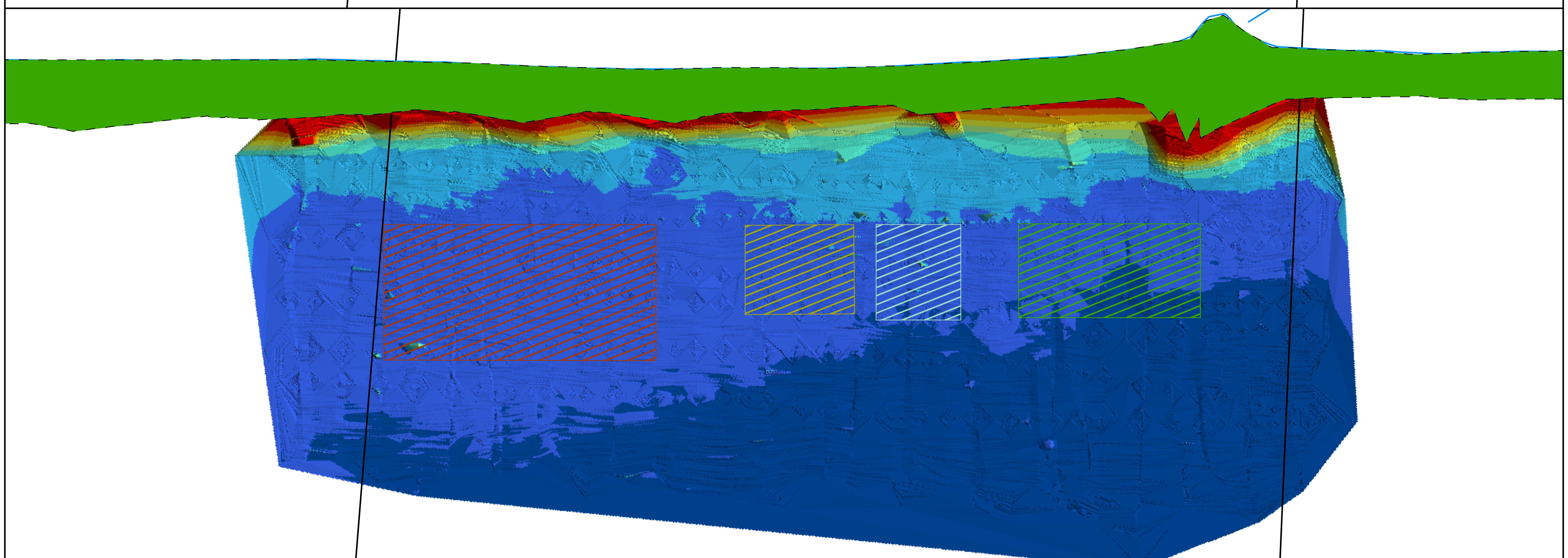
- Pre-wetting the activated carbon reduced the settling time.
- Screening the activated carbon ensured a uniform particle size to prevent clogging in the distribution lines.
- Linking positioning equipment with recent bathymetric surveys to aid in vertical positioning during activated carbon placement.
- Installing universal couplings to improve control of the orientation of the equipment.
- Fabricating mechanical mixing devices such that they were rigid enough to enable penetration to the desired depth, yet flexible enough to yield to obstructions without impacting the performance of the entire unit.
- Including air relief vents in the design of the enclosing shrouds to prevent formation of an air-filled space within the shroud as the apparatus was lowered into and below the water surface. The air-filled space could result in release of air bubbles during carbon placement and mixing, potentially causing release of air bubbles and suspended solids to the water column. The air relief vents were therefore included to limit the transport of resuspended material generated during activated carbon placement.
- Increasing the surface area of the tine sled that was in direct contact with the sediments to support the equipment weight (greater than 1 ton) with minimal penetration of the sled into Grasse River sediments.
- Adding a fabric "skirt" to the base of the tiller to reduce the potential for transport of resuspended material from beneath the tiller during mixing and repositioning.
- Although initial Phase 1 trials using the tine sled did not fully achieve the pilot performance objectives, the performance of this equipment was subsequently enhanced by including an attachment to the end of the trailing set of mixing tines, to improve mixing of activated carbon within the sediment.

2.2 Bathymetric Survey

On July 26 and 27, 2006, prior to initiating in-water construction activities, TtEC/Brennan conducted a bathymetric survey of the study area to characterize pre-construction conditions. This pre-construction bathymetric survey was performed using a Trimble real-time kinematic (RTK) global positioning system (GPS) coupled with a single beam, high frequency echo sounder. Hypack Survey software was used to collect the data from the RTK GPS and echo sounder units were used to track the equipment's position. Results of the pre-construction bathymetric survey are presented on Figure 2-3. Quality assurance/ quality control checks of these acoustical survey measurements are discussed in Section 3.1.4.4.



(a) Pre-Construction Single Beam Survey Points



(b) Interpolated Surface based on Pre-Construction Single Beam

N

GRAPHIC SCALE

0 25 50 100 Feet

LEGEND

Sediment Elevation (ft)

- > 146
- 145 - 146
- 144 - 145
- 143 - 144
- 142 - 143
- 141 - 142
- 140 - 141
- 139 - 140
- 138 - 139

Single Beam Points (7/27/06)

ACPS Treatment Areas

- Initial Testing Area
- Mixed Tiller Treatment Area
- Tine Sled Mixed Treatment Area
- Unmixed Tiller Treatment Area

Near Shore Area

Grasse River Shoreline

Sediment Probing Transects

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

Figure 2-3.
Pre-Construction
Bathymetric Survey Results
(7/27/06)

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2.3 Baseline Monitoring Activities

Baseline monitoring was conducted prior to in-water construction activities to obtain data on pre-application conditions. Baseline monitoring activities were conducted from July through September 2006 and included erosion potential testing, benthic invertebrate community assessment, qualitative aquatic habitat survey, field and laboratory biological studies, and sediment sampling.

A summary of these monitoring activities is presented in the following sections. The number of samples collected and analyzed during each event is presented in Table 2-1. Details of the monitoring activities and a summary of results are included in Appendix A.

Table 2-1
2006 ACPS Data Collection Summary

Event	Number of Sampling Events	Number of Locations	Number of Samples [1]	Analyses [6]
Baseline Monitoring [2]				
Erosion Potential Testing	1	5	40	• Erosion potential of sediments through evaluation of TSS levels in overlying water in a laboratory shaker apparatus
Benthic Invertebrate Community/Aquatic Habitat Survey	1	10	10	• Invertebrate species composition, biomass, TOC, and grain size
Biological Studies	1 1	7 13	7 13	• In situ PCB biouptake • Aqueous equilibrium, PCB desorption, and ex situ PCB biouptake
Sediment [3]	1 1	9 86	54 150	• PCB congeners, microscopy examination, TOC, and BC-C (36 select samples) • TOC, bulk density, moisture content, and BC-T (84 select samples)
During Application Monitoring [4]				
Water Column [5]	20 1 1	5 5 3	85 5 5	• PCB Aroclor and TSS • POC (upstream/downstream transects and local monitoring locations) • POC (within mixed treatment area and immediate vicinity of tiller)
Sediment [3]	continuous	252	342	• TOC, bulk density, moisture content, BC-T (235 select samples), and BC-C (114 select samples)

Notes:
1. Count does not include quality assurance/quality control (QA/QC) samples (i.e., duplicates, matrix spike/matrix spike duplicates, and rinse blanks) submitted for various analyses or the number of samples currently on hold for potential future analyses.
2. Baseline monitoring activities are summarized in this section and detailed in Appendix A. Sampling locations are depicted in Figures 2-4, 2-5, and 2-6.
3. For sediment, the number of locations represents the total number of cores collected. The number of samples reflects the number of composite samples and/or the total number of sample intervals obtained from the cores.
4. Monitoring activities during construction are summarized in Sections 3.3 and 3.4 and detailed in Appendix A. Sampling locations are depicted in Figures 3-5, 3-7, 3-8, and 3-10.
5. The number of water column samples includes the number of composite samples analyzed, but does not include the number of grab samples collected to create each composite sample.
6. Two methods were used to estimate black carbon levels in sediment samples. For details on the black carbon-chemothermal pre-combustion (BC-T) and the black carbon-chemical pre-oxidation (BC-C) methods, see Section 3.3.2 and Appendix A.

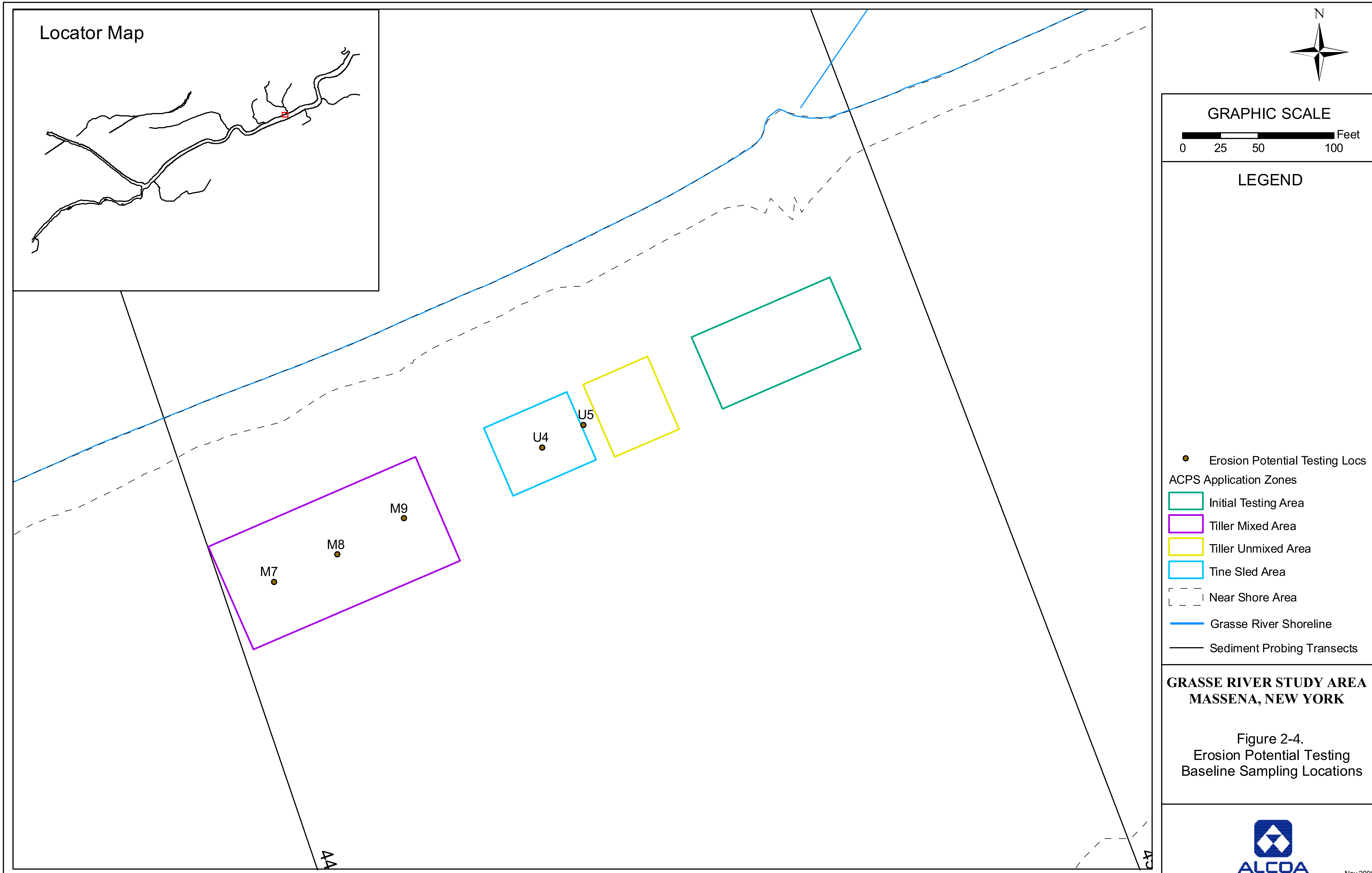
BC-T = black carbon-chemothermal pre-combustion technique
BC-C = black carbon-chemical pre-oxidation technique
PCB = polychlorinated biphenyl
POC = particulate organic carbon
TOC = total organic carbon
TSS = total suspended solids

2.3.1 Erosion Potential Testing

The erosional behavior of the native bulk surface sediments in the ACPS area were evaluated through testing of sediment cores with a sediment shaker apparatus (Tsai and Lick 1986). This test protocol was deemed appropriate for this study because the shear stresses expected in the vicinity of the pilot test area during a 100-year flood flow (10 dynes per square centimeter [dynes/cm^2]; Alcoa 2001) are consistent with the upper end of the range of shear stresses tested by the shaker apparatus. This testing was conducted during the week of July 31, 2006, and consisted of the collection of two sediment cores from each of five locations, for a total of 10 cores (see Figure 2-4). Two cores were collected from each location to recognize the spatial variability that often exists in river sediments, even in closely spaced cores. Six cores were collected from the Mixed Tiller Treatment Area, four cores were collected from the Tine Sled Mixed Treatment Area (note two of these cores were collected immediately outside of the Tine Sled Mixed Treatment Area boundary). Cores were collected using a manual push core sampler that typically retrieved between 6 and 12 inches of sediment from the sediment surface (inner core diameter of 4-9/16th inches). Upon retrieval, the cores were visually inspected for a relatively even sediment surface within the core.

After visual observation was complete, each core was placed in the shaker apparatus (a device that simulates bottom shear forces at the sediment-water interface by creating turbulence within the water column directly overlying the core [Tsai and Lick 1986]) and subjected to shear stresses of 3, 5, and 9 dynes/cm^2 for 10-minute test periods. After each test period, a water sample was collected from the overlying water column and submitted to the ChemLab for total suspended solids (TSS) analysis. Four TSS samples were collected per core (one prior to testing and one after each of the applied shear stresses). A total of 40 samples were submitted to ChemLab for TSS analyses. Quality assurance/quality control (QA/QC) samples included one blind duplicate sample; however, this sample was spilled during transport to the lab and, therefore, not analyzed for TSS. Results of this baseline testing are presented in Appendix A.

Data collected during the baseline study were used to determine the erosion potential properties of the native sediments in the ACPS work area. Results from the baseline testing were variable, but followed the expected pattern of increased resuspension potential with increasing bottom shear stress. The variability observed in the baseline study is consistent with the variability observed during prior sediment shaker studies in the river (Alcoa 2001). The mean erosion potential for each of the two treatment areas were similar, differing by less than a factor of two at all shear stress levels (see Appendix A for details).



GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

Figure 2-4.
Erosion Potential Testing
Baseline Sampling Locations

\\Adrianne\D_DRIVE\ALCgra\Analysis\ACPS\GIS\basemaps\GAC_basemap_060925.mxd

The erosion potential data for the ACPS area samples were consistent with those collected from this reach of the river during erosion potential testing conducted in 1998 and 2000 (Alcoa 2001; Figure 2-5). Four historic cores (two each from T42 and T46) were included in this comparison due to their spatial proximity to the ACPS work areas. The range of resuspension potential values determined for these four historic cores are presented as the shaded region in Figure 2-5, while the average resuspension potential values from the 2006 ACPS data are presented as symbols. The erosion properties measured in the ACPS in 2006 are within the range of historic data at all shear stress levels (Figure 2-5). The similarity between the 1998/2000 and 2006 erosion potential testing data suggests that no significant change in erosion properties has occurred in the sediments in this reach of the river since 1998.

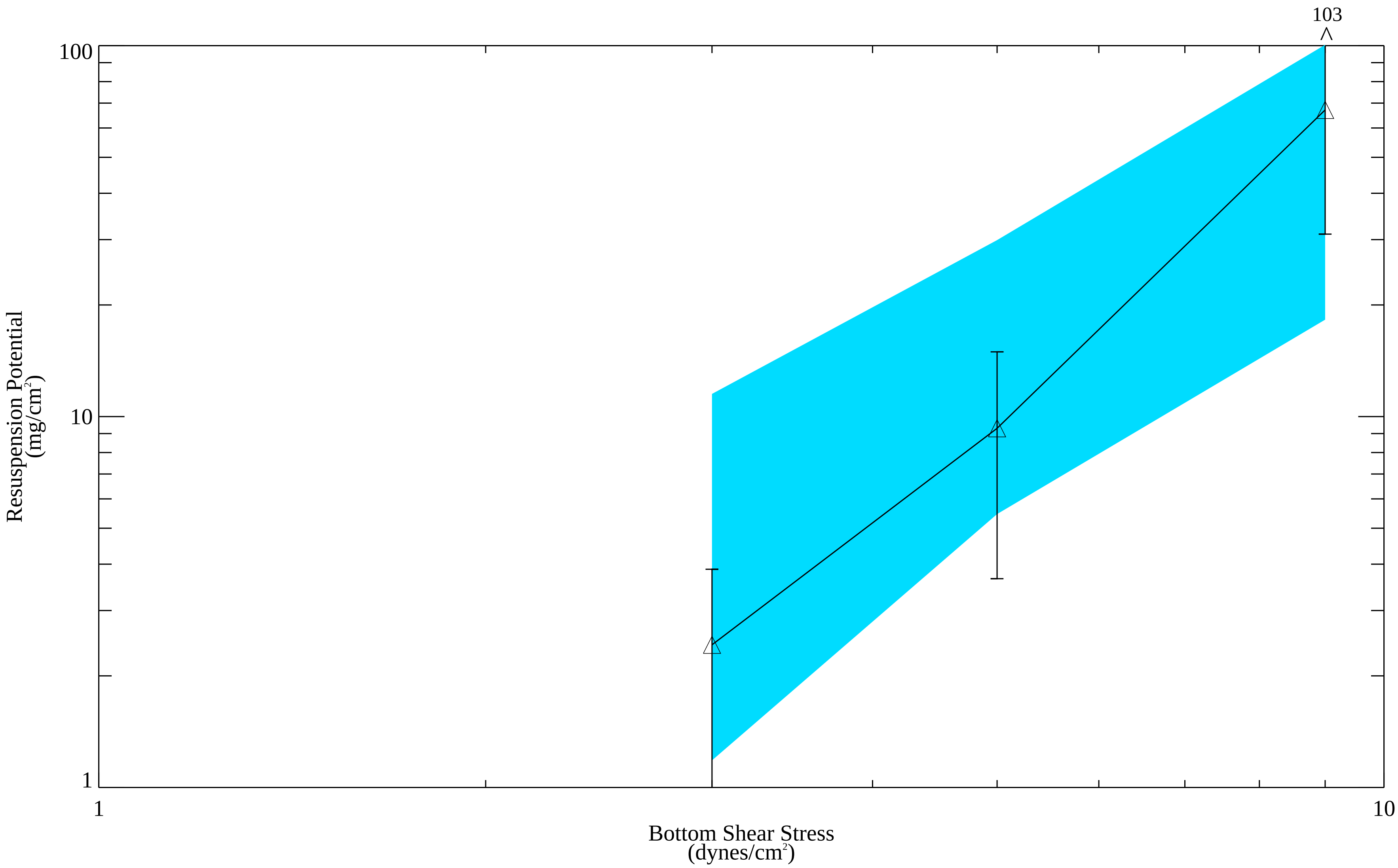


Figure 2-5. Comparison of Average Resuspension Potential in the ACPS Area and Historic Measurements
Cores collected August 2-3, 2006 for Activated Carbon Pilot Study baseline characterization.
The blue polygon represents the range of historic data collected from T42 and T46 in 1998 and 2000.
Error bars represent +/- 2 standard errors.
Data table: ero_pot_ACPS

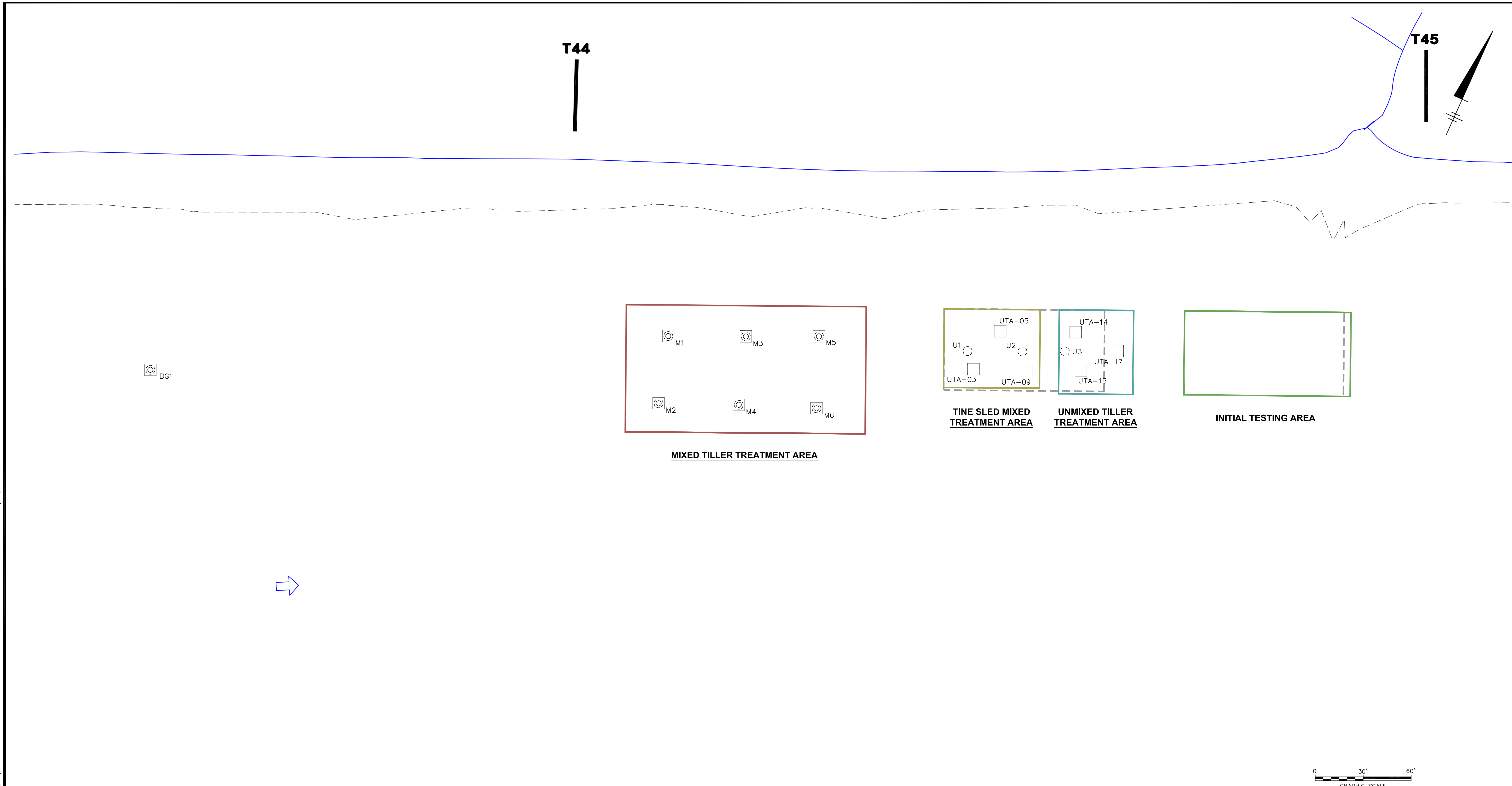
ARC - D:\ALCgra\Analysis\ACPS\IDL\shaker_study\resus_pot_vs_tau.pro
Thu Nov 01 16:35:06 2007

2.3.2 Benthic Invertebrate Community Assessment

Benthic invertebrate community sampling was conducted on August 24 and 25, 2006, to provide baseline data for comparison with post-activated carbon application data to evaluate changes to the benthic community as a result of activated carbon placement. A total of 10 samples were collected from the Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas as well as a background location (Figure 2-6) in accordance with the *Quality Assurance Work Plan for Biological Stream Monitoring in New York State* (NYSDEC June 2002). All samples were submitted to GEI Consultants Inc./Chadwick Ecological Division (Chadwick) for identification of benthic species to the lowest practical taxonomic level and determination of biomass.

In addition, sediments from a co-located grab sample were concurrently collected at each benthic sampling location. These sediments were submitted to NEA for TOC analysis and to the CDM Soils Laboratory for grain size analysis. Additional detail on the sampling methods and procedures are included in Appendix A.

A multi-metric approach was utilized to characterize the benthic community per the *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (RBPs; USEPA 1999). Metrics are measures used to quantify aspects of community structure and function that change in predictable ways with increased human influence and/or perturbation (Barbour et al. 1995); these metrics provide a consistent theoretical framework for analyzing complex assemblage data (USEPA 1999). Seven metrics from the RBP approach were used to define the baseline macroinvertebrate community characteristics. Consistent with previous site evaluations, the metrics chosen for this analysis included measures of benthic abundance, diversity, tolerance, and life history adaptations. The seven site-specific metrics chosen for this analysis are: 1) total organisms; 2) biomass; 3) number of taxa; 4) diversity index; 5) tolerance index; 6) feeding guild; and 7) organism habit. Further discussion of these metrics, along with the benthic invertebrate data, is presented in Appendix A.



LEGEND:

- T45 — 1992 SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- U2 — BENTHIC INVERTEBRATE COMMUNITY SAMPLING LOCATION
- M1 — IN-SITU BIOLOGICAL SAMPLING LOCATIONS
- UTA-17 — EX-SITU BIOLOGICAL BULK SEDIMENT SAMPLING LOCATIONS
- FLOW DIRECTION
- TARGET INITIAL TESTING AREA
- TARGET MIXED TILLER TREATMENT AREA
- TARGET UNMIXED TILLER TREATMENT AREA
- TARGET TINE SLED MIXED TREATMENT AREA
- ORIGINAL UNMIXED TREATMENT AND INITIAL TESTING AREA BOUNDARIES

NOTE:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY CONSTRUCTION DOCUMENTATION REPORT

BENTHIC INVERTEBRATE COMMUNITY AND BIOLOGICAL SAMPLING LOCATIONS

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FIGURE **2-6**

SYR-85-KMD BCP KLS LAYER: ON=*, OFF=*REF*
G:\CAD\ACTIVE\-DWG\ACT\10811002\10811C03.DWG SAVED: 10/30/2007 8:11 AM LAYOUT: DL PAGESETUP: DL2B-PDF PENTABLE: PLTFULL.CTB PRINTED: 10/30/2007 8:11 AM BY: KSARTORI
PROJECTNAME: ----
XREFS: 10811X00 10811X02 IMAGES: 10811X01.TIF

Results of the benthic analysis show a community that is typical of one that would inhabit fine-grained sediments in the Grasse River based on multiple years of previous observations (e.g., moderate benthic diversity and abundance, moderate tolerance, high percentage of gatherers and burrowers, low percentage of filterers, clingers, and climbers, etc.). Of the nine benthic orders represented, 80 percent of the overall taxa came from the orders Diptera (midge larva) and Oligochaeta (aquatic worms), with 65 percent of the overall taxa being burrowers (i.e., organisms that burrow in sediment). The mean representation of these orders is similar among the Mixed Tiller Treatment Area (M1 through M6), the Tine Sled Mixed and Unmixed Tiller Treatment Areas (U1 through U3), and upstream background location (BG1; Figure 2-6). Grain size results and TOC values (which reflect the availability of benthic food) were comparable between areas as well. Additional details regarding the benthic community analysis are presented in Appendix A.

The potential effects of the activated carbon application activities on the benthic community will be assessed as part of the ACPS long-term monitoring program by comparing post-activated carbon application community metrics to baseline metrics. The upstream control location characteristics will be used to evaluate natural changes in the different communities that may be the result of other stressors or environmental conditions not related to construction activities.

2.3.3 Qualitative Aquatic Habitat Survey

To document the presence or absence of aquatic vegetation in the pilot study area, visual observation of the area was performed on August 24, 2006, using an underwater video camera in the Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas. Water quality measurements were also taken from each treatment area and at the background location.

Based on visual observations and inspection of the underwater video recording, the baseline substrate in the treatment areas was primarily homogeneous, fine-grained sediments (bare sediments) with no apparent vegetation growing on the channel bottom. No other habitat features (such as large woody debris or rocks and boulders) were observed. The aquatic habitat data and further details on the survey procedures are presented in Appendix A. The visual observations are supplemented by supporting information from the grain size and TOC results (collected during the benthic invertebrate community sampling event) and water quality measurements.

2.3.4 Field and Laboratory Biological Studies

2.3.4.1 In Situ PCB Biouptake Studies

Baseline in situ bioaccumulation tests were carried out between August 24 and September 8, 2006. Note that a trial field deployment was performed between July 17 and August 1, 2006 (prior to the baseline studies) to evaluate the logistics associated with deploying and retrieving the caged worms in the river and the survival of the worms in field conditions. Results from the pre-treatment in situ studies will serve as the baseline conditions for comparison of the effects of activated carbon addition to the sediments.

Lumbriculus variegatus were deployed in screened cages or bioassay chambers at six sampling locations in the Mixed Tiller Treatment Area and at one reference location for an exposure period of 14 days (see Figure 2-6). At each sampling location, six replicate chambers were deployed, mounted together on a rack for ease of retrieval. To initiate the caged exposure, surficial sediment was collected from the location and split for use in the in situ and ex situ biouptake tests. After the 14-day exposure duration, the cages were located and retrieved, and the worms were separated from the sediment for submittal to the UMBC laboratory for PCB extraction and analysis.

The recovery of tissue weight from the exposure chambers ranged from 75 to 102 percent, with an average recovery of 87 percent for all deployments. Congener level PCB analysis is currently being conducted on worms retrieved from each exposure chamber separately. The results of these analyses will be presented in a separate report. Additional details on the field effort and results are included in Appendix A.

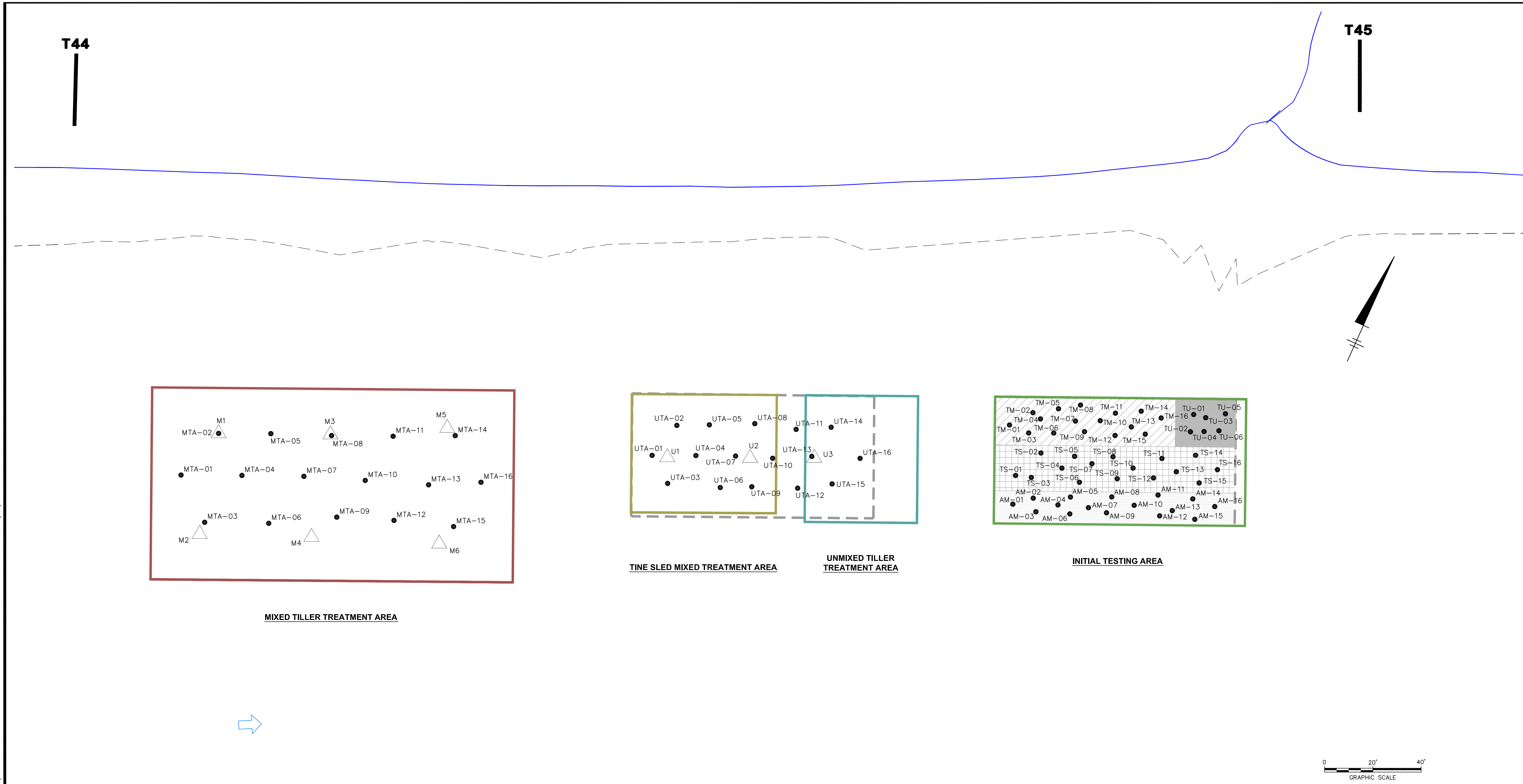
2.3.4.2 Ex Situ PCB Biouptake

In parallel with the in situ biouptake studies, laboratory biouptake studies were conducted using *L. variegatus* as test organisms. Bioaccumulation tests were conducted for the baseline study from the locations sampled during the in situ biouptake studies (see Figure 2-6). Organisms from the same batch of *L. variegatus* were used in the in situ study and the laboratory exposure study. Worms were exposed to the sediments for 14 days and maintained in a water bath with alternating light and dark periods. At the termination of the experiment, worms were removed from the sediments, depurated, homogenized, and extracted for analysis. Cleanup and PCB analysis of the worm extracts were in progress at the time this Construction Documentation Report was developed.

Ex situ bioaccumulation tests were conducted successfully with adequate recovery of tissue mass for chemical analyses. The average recovery of tissue weight from the exposure beakers in the Mixed Tiller Treatment Area ranged from 58 to 87 percent, with an overall average recovery of 69 percent for all deployments. The recovery of tissue weight from the exposure beakers in the Unmixed Tiller Treatment Area ranged from 105 to 149 percent, with an overall average recovery of 120 percent for all deployments. PCB analyses are currently being completed, and the results of these analyses will be presented in a separate report. Additional information on the ex situ studies is presented in Appendix A.

2.3.5 Baseline Sediment Sampling

Two baseline sediment sampling events were conducted to obtain additional data on the existing sediment conditions. The first baseline sediment core collection event was conducted on August 8, 2006, and included collection of nine sediment cores from the Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas (Figure 2-7). Sampling included collection of cores to refusal with the top 12 inches of material submitted to UMBC for characterization of TOC and PCB levels, and also for microscopy analysis. These samples were also submitted for black carbon analysis following development by UMBC of the black carbon-chemical pre-oxidation (BC-C) verification method (Figure 2-7; see Appendix A).



LEGEND:

T45 1992 SEDIMENT PROBING TRANSECT

RIVER BOUNDARY

NEAR SHORE AREA BOUNDARY

M2 BASELINE SEDIMENT CORE COLLECTION LOCATION (BLACK CARBON [BC-C], MICROSCOPY, AND PCB ANALYSIS)

MTA-09 BASELINE SEDIMENT VERIFICATION CORE COLLECTION LOCATION (TOC, BULK DENSITY, PERCENT MOISTURE, AND BLACK CARBON [BC-T] ANALYSIS)

FLOW DIRECTION

TARGET INITIAL TESTING AREA

TARGET MIXED TILLER TREATMENT AREA

TARGET UNMIXED TILLER TREATMENT AREA

TARGET TINE SLED MIXED TREATMENT AREA

ORIGINAL UNMIXED TREATMENT AND INITIAL TESTING AREA BOUNDARIES

MIXED TILLER (INITIAL TESTING AREA)

UNMIXED TILLER (INITIAL TESTING AREA)

TINE SLED MIXED (INITIAL TESTING AREA)

ADDITIONAL TESTING (INITIAL TESTING AREA)

NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
2. BASELINE SEDIMENT SAMPLES IN THE INITIAL TESTING AREA ALL HAVE THE PREFIX "TEST-" AND FOR CLARITY IN THE FIGURE THIS WAS OMITTED (I.E., THE SAMPLE ID FOR AM-01 IS TEST-AM-01).

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY
CONSTRUCTION DOCUMENTATION REPORT

BASELINE SEDIMENT SAMPLING LOCATIONS

ALCOA

FIGURE
2-7

In samples collected from the Mixed Tiller Treatment Area, black carbon (BC-C) in the top 3 inches averaged 0.08 percent and tended to be lower than those measured in the deeper samples (0.10 percent). An opposite trend was observed in samples collected from the Tine Sled and Unmixed Tiller Treatment Areas; average black carbon (BC-C) levels in the top 3 inches (0.16 and 0.14 percent, respectively) tended to be slightly higher than those observed in the deeper samples (0.08 and 0.07 percent, respectively; Figure 2-8). However, given the variability observed in the measurements and the limited number of samples upon which these comparisons are based, there were no statistically significant differences in baseline black carbon (BC-C) levels between treatment areas and between depths. For this reason, all baseline samples were combined and used to define an average baseline black carbon (BC-C) level of 0.10 percent for the ACPS area.

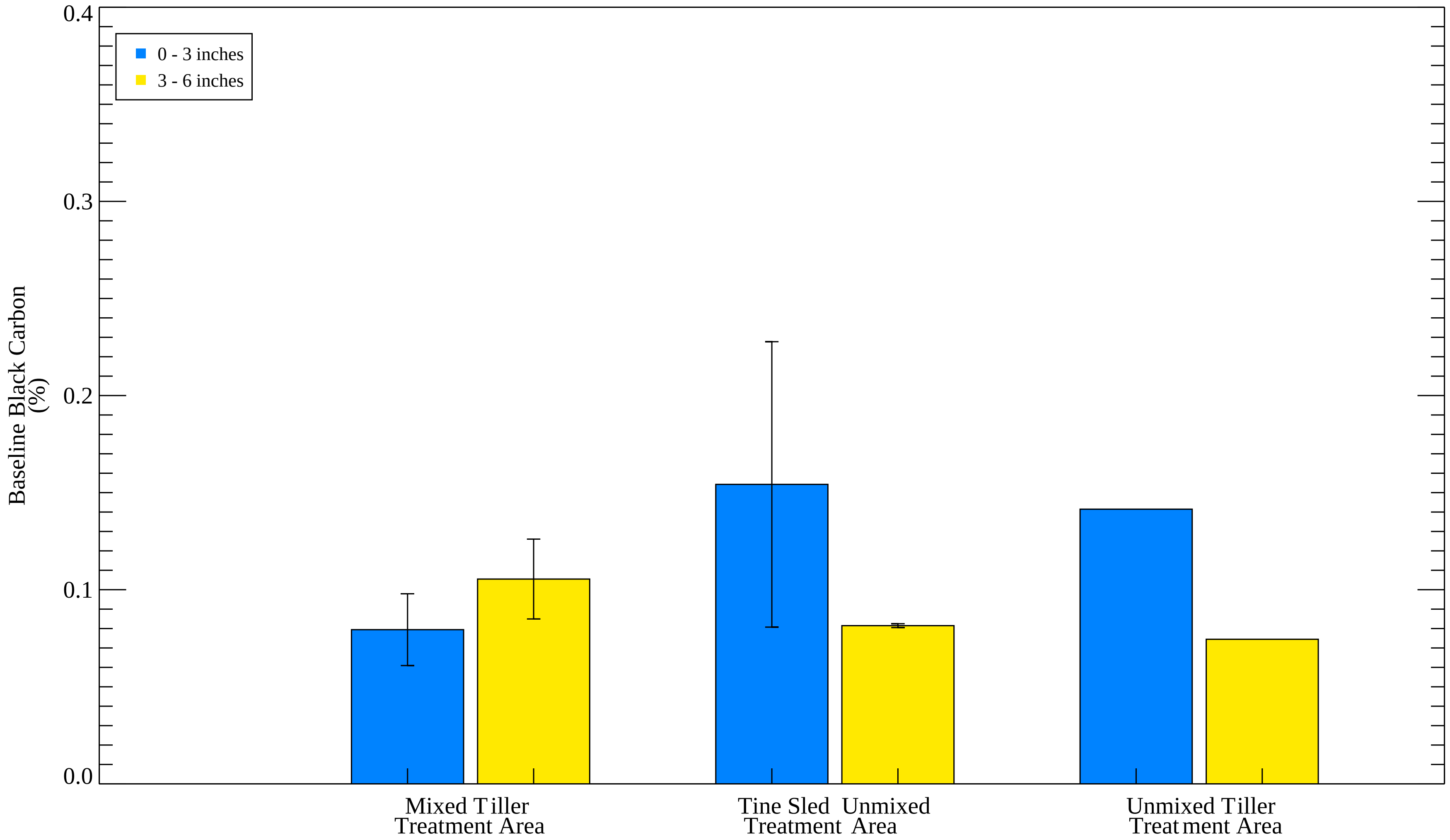


Figure 2-8. Pre-Application Black Carbon (BC-C) Levels in the ACPS Areas
Black carbon results from UMBC based on black carbon-chemical preoxidation method (BC-C).
Error bars represent +/- 2 standard errors.

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\Baseline\baseline_BlkC_byarea.pro
Mon May 14 10:48:28 2007

The second baseline sediment core collection event was performed September 12 through 15, 2006, in the Initial Testing, Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas (Figure 2-7). Sampling included collection of 86 cores with submittal of the top 6 inches of recovered material to NEA for TOC, percent moisture, and bulk density analysis, with black carbon analysis requested at a later date (Figure 2-8). The information obtained from this sampling event was used to provide a more complete data set for comparisons between pre-activated carbon application and during/post-activated carbon application conditions. A summary of analytical results obtained from this event is presented in Appendix A.

TOC levels in the top 3 inches of sediments were variable, but exhibited no consistent differences across treatment areas (Figure 2-9). Overall, TOC levels in the top 3 inches ranged from 2.9 to 8.2 percent, with average levels of 5.4, 5.5, 5.3, and 5.6 percent for the Initial Testing Area, and Mixed Tiller, Unmixed Tiller, and Tine Sled Mixed Treatment Areas, respectively. TOC levels in the deeper (3 to 6 inches) samples, where available, were similar to those measured in surface sediments. The observed similarities are supported by a comparison of the 95th percentile confidence limits (i.e., +/- two standard errors), which revealed no statistically significant differences in baseline TOC levels between treatment areas and between depths. Therefore, combining samples from all areas and both depth intervals yielded an average baseline TOC of 5.4 percent for the native sediments in the ACPS area.

Further description of the sampling methodology and results for each event is presented in Appendix A

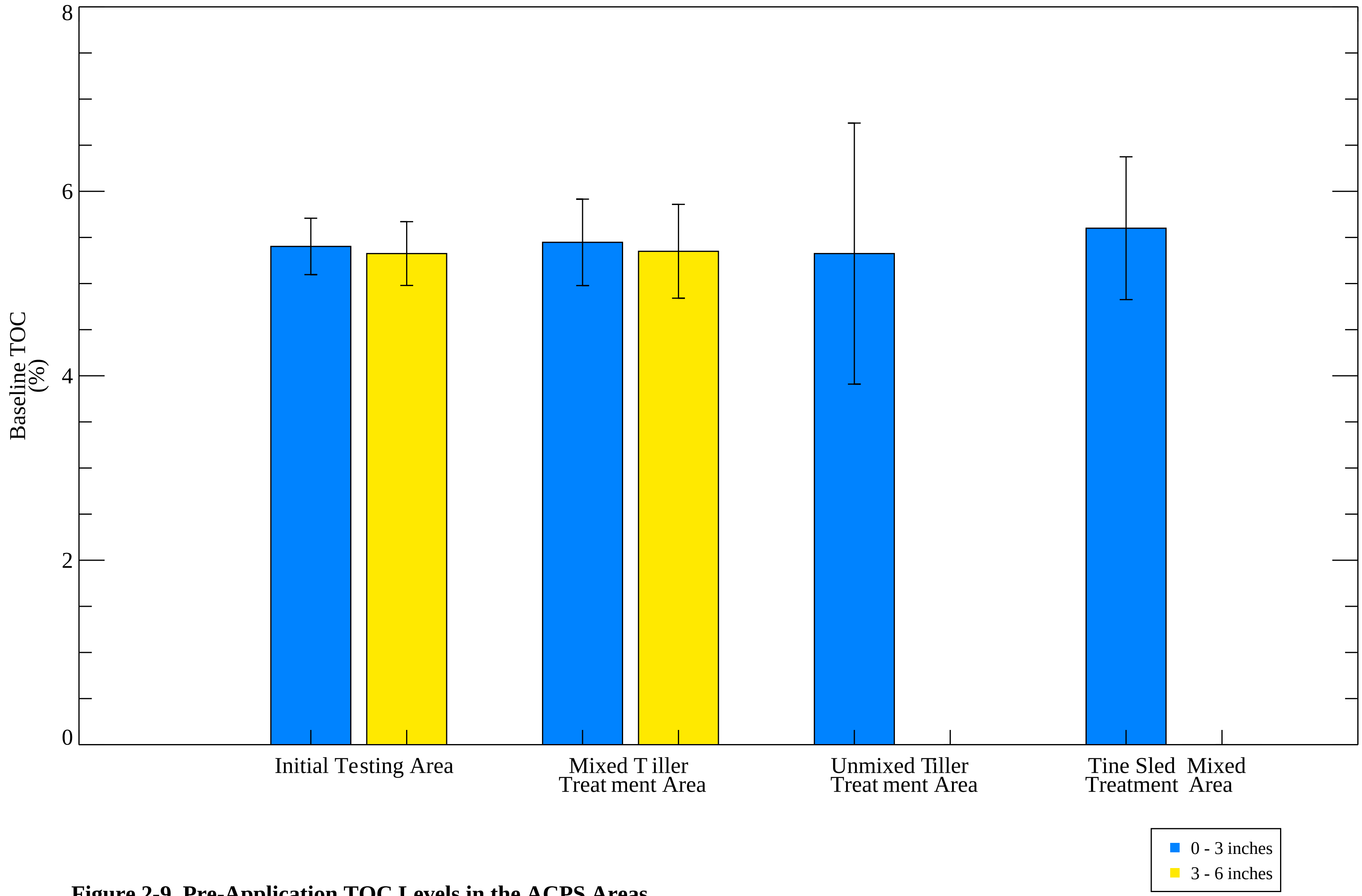


Figure 2-9. Pre-Application TOC Levels in the ACPS Areas
Duplicates are averaged.
Error bars represent +/- 2 standard errors.

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\Baseline\ph2_baseline_toc_byarea.pro
Mon May 14 10:52:12 2007

3 IMPLEMENTATION OF THE ACTIVATED CARBON PILOT STUDY

Following equipment fabrication and upland testing (Phase 1) as well as other pre-construction activities, the Phase 2 field activities of the ACPS were initiated on September 11, 2006. This section describes the implementation of the ACPS, including all activities related to in-water construction.

3.1 Overview of Project Management Activities

Critical to the success of the project was the coordination of construction, data collection, and field decision activities as well as management of the multidisciplinary ACPS team. Therefore, several mechanisms were established to manage and document progress of the ACPS during implementation. Key elements of the project management system included:

- Technical and construction lead team meetings
- Weekly progress meetings with the Agencies
- Notification of engineering changes
- Quality control procedures
- Provision of project access for regulatory oversight, including resident access agreements for project observation, boat access on river, and on-barge observation

Additional details regarding each of the project management elements are provided in the following sections.

3.1.1 Technical and Construction Lead Team Meetings

Technical team meetings were held at the project site (and via teleconference) at least three times per week, and more frequently as needed, throughout implementation. Participants typically included the construction manager, project engineer, the TtEC project manager and technical advisor, the on-site Alcoa manager, and other personnel from Alcoa, Anchor, ARCADIS BBL, CDM, and QEA. Technical experts participated in the lead team meetings as necessary to meet the project objectives. These technical meetings were used to review sediment core data and plan each day's construction and monitoring activities based on that review.

3.1.2 Weekly Progress Meetings

Progress meetings were held on a weekly basis at the project site (and via teleconference) to provide an overview of all field activities and data interpretation to date. Participants typically included representatives from Alcoa and its construction management team (Anchor, ARCADIS BBL, CDM, and QEA), TtEC/Brennan, USEPA, Earth Tech, NYSDEC, NYSDOH, and the SRMT. The topics of discussion for each progress meeting typically included:

- Health and safety
- Environmental compliance (spills/responses, etc.)
- Action items from previous meetings
- Review of site operations
- Environmental monitoring
- Schedule

Several key recommendations from the Agencies were identified during these weekly project meetings, as discussed elsewhere in this report.

Following the conclusion of each progress meeting, a summary of the meeting was prepared and distributed to the team prior to the next meeting. Appendix E presents the minutes for each of the weekly progress meetings.

3.1.3 Engineering Change Notification Process

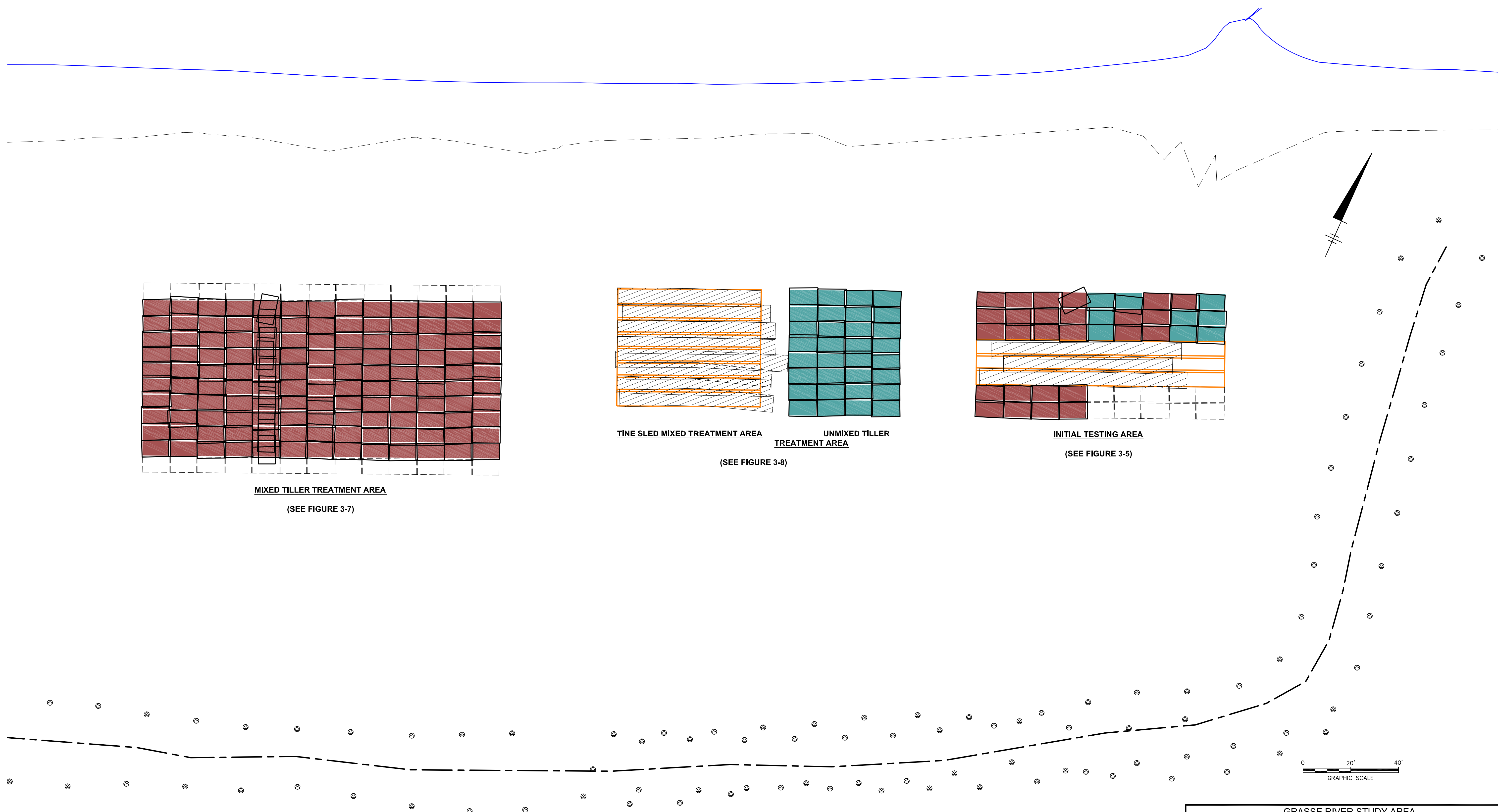
During implementation of the ACPS, minor modifications to the Work Plan (Alcoa 2006b) became necessary to reach the project objectives. Proposed modifications were discussed with USEPA and its oversight contractor and documented in Engineering Change Notices (ECNs) for USEPA approval. Each ECN contained information regarding the basis for the proposed change, schedule impacts, and the documents/deliverables affected. In total, two ECNs were prepared and subsequently approved by USEPA during implementation of the ACPS:

- ECN No. 1 – Sub-division of unmixed treatment area to accommodate tine sled application in a secondary mixed treatment area (see Figure 3-1)
- ECN No. 2 – Use of alternate source of activated carbon in the Unmixed Tiller and Tine Sled Mixed Treatment Areas

Three additional ECNs were prepared following field implementation:

- ECN No. 3 – Change in analytical method used to measure the amount of activated carbon within the Grasse River sediments; approved by USEPA on August 20, 2007
- ECN No. 4 – Change in the scope of the long-term monitoring plan; approved by USEPA on August 20, 2007
- ECN No. 5 – Additional changes in the scope of the long-term monitoring plan; submitted for USEPA approval on November 2, 2007

These ECNs are included in Appendix F.



LEGEND:

- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- APPROXIMATE SILT CURTAIN LOCATION
- SILT CURTAIN ANCHOR LOCATION
- FLOW DIRECTION
- NO CARBON
- ACTUAL TILLER CELL
- TARGET MIXED TILLER CELL
- TARGET UNMIXED TILLER CELL
- ACTUAL TINE SLED LANE
- TARGET TINE SLED LANE

NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
2. THE TARGET AND ACTUAL LOCATIONS OF THE TILLER PLACEMENT CELLS AND TINE SLED APPLICATION LANES WERE PROVIDED BY J.F. BRENNAN.

GRASSE RIVER STUDY AREA
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OVERVIEW OF CARBON APPLICATION AREAS

ALCOA

FIGURE
3-1

3.1.4 Quality Control Procedures

During the ACPS, a set of quality control procedures was implemented to ensure that the project objectives were achieved in a safe and efficient manner. These included the following:

- Technical and construction lead team meetings (see Section 3.1.1)
- Daily process control logs and tracking sheets
- Video documentation
- Survey QA/QC

These quality control procedures generally focused on communication between the technical team and construction contractor, timely data collection and evaluation, and appropriate record keeping and reporting of work progress. Each of the quality control procedures is described in greater detail below.

3.1.4.1 Technical and Construction Lead Team Meetings

As discussed in Section 3.1.1, technical and construction lead team meetings were held throughout the ACPS to review monitoring data and plan construction activities. These meetings allowed direct communication between the technical team and the contractor, which was critical in identifying problems and planning daily activities.

3.1.4.2 Daily Process Control Logs and Tracking Sheets

The TtEC/Brennan team developed and utilized a set of process control logs to document the various parameters related to activated carbon placement. Data were recorded in real-time by the construction crew for each tiller “application cell” and each tine sled “application lane.” Pertinent data included, but were not limited to: date, time, quantity of activated carbon applied, and any comments about the application. In addition to the process control logs, TtEC/Brennan also maintained a graphical progress tracking map on a daily basis, which indicated the work completed to date and the planned work for the following day. The progress tracking map was annotated with pertinent information regarding the application details. Appendix G includes the process control logs for the mixed tiller application, tine sled application, and the unmixed tiller application. In addition, Appendix G also includes the process tracking map for the entire ACPS area.

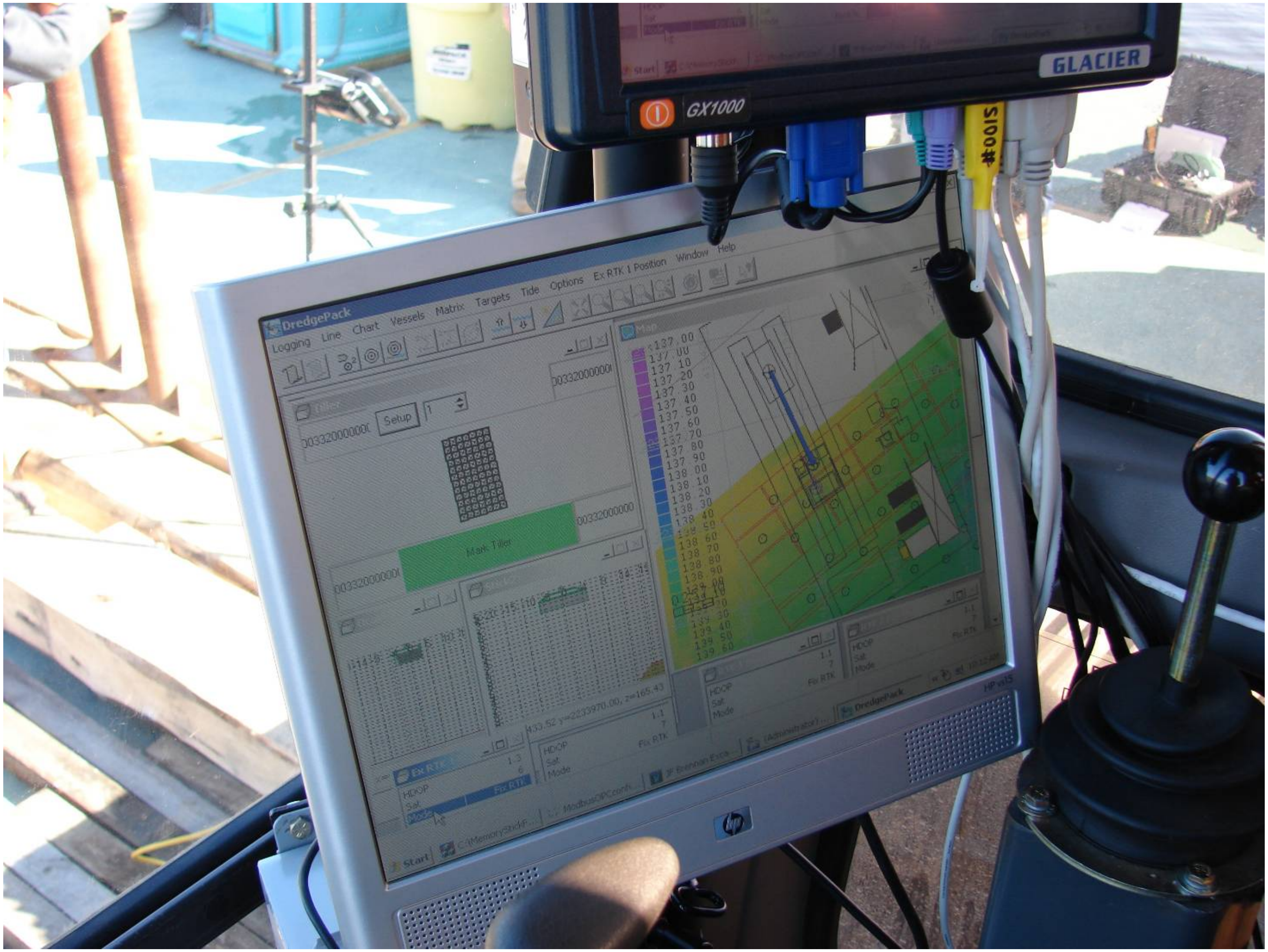
3.1.4.3 Video Documentation

An underwater video camera was deployed at various stages during the ACPS to observe and document placement of activated carbon and the post application stability of the activated carbon. In general, little or no activated carbon release into the water column was observed during application with the tiller equipment in either the mixed or unmixed applications. Furthermore, the underwater videos indicated that turbidity generated by the tiller mixing operation was very minor even within a few feet of the enclosing shroud.

The video observations were also used to verify field measurements of the sediment surface for comparison with the bathymetric survey, as discussed below. Further discussion of the underwater video documentation is provided in Section 3.4.3.

3.1.4.4 Survey QA/QC

A baseline bathymetric survey of the study area was conducted prior to the initiation of in-river construction activities (see Figure 2-3). TtEC/Brennan used this survey information in conjunction with the RTK GPS/Hypack position tracking system on the tiller equipment to position the equipment both laterally and vertically within each application cell. The operator's cab of the backhoe, to which the tiller was fixed, was outfitted with a display monitor showing the equipment position. This display included color-coded and numeric depictions of the equipment position relative to the target location that were updated in real-time. Figure 3-2 shows the display monitor used for the tiller positioning.



ALCOA

Figure 3-2
Tiller Operator Cab Display Monitor

However, during initial work within the Initial Testing Area, it was discovered through underwater video observations that the bathymetric survey may not have accurately identified the sediment surface elevation in all locations, potentially due to an error with the initial survey data. Therefore, to minimize vertical positioning errors with the tiller equipment associated with interpretation of the earlier baseline bathymetric survey (see Section 2.2), regular checks of the sediment surface elevation were performed using manual survey techniques at discrete locations within the mixed and unmixed tiller application areas. A large (2-foot-sqaure) aluminum plate was fixed to the base of a rigid aluminum survey rod to more accurately identify the sediment water interface, considering the very soft nature of the surficial sediments. These physical measurements were compared to the acoustical survey measurements at the same locations. If the measurements from the two methods differed, the physical measurement was used to calibrate the acoustical measurement for the specific application cell represented by the physical survey.

As recommended by USEPA's on-site representative during a weekly progress meeting (see Section 3.1.2), field measurements of the sediment surface elevation were performed at several points within a given tiller application cell to identify potential small-scale variation in bathymetry. Implementation of this recommendation provided additional confidence in identifying the appropriate elevation for equipment positioning to achieve the target mixing depth.

As an additional check of the vertical positioning of the equipment, ARCADIS BBL conducted independent physical measurements within several tiller application cells for comparison to the measurements made by TtEC/Brennan.

3.1.5 Access for Regulatory Oversight

During the ACPS, Alcoa provided site access for regulatory oversight and other site visitors including the following:

- Shore-side observation point immediately adjacent to the in-river project site: This observation point was made available through access agreements between Alcoa and the local residents.

- Boat access on river: Alcoa provided for on-river access to the site and observation of the construction activities by the regulatory oversight using a small vessel and captain.
- Marine plant observation: At various times during implementation, access to the marine plant by the regulatory oversight team was provided to view the activated carbon placement and support equipment.

3.2 Mobilization and Site Preparation

Mobilization and site preparation activities for the ACPS were initiated on September 11, 2006. These activities included the following:

- Alcoa health and safety orientation and TtEC/Brennan site-specific training were conducted for all site personnel.
- The St. Lawrence Seaway Development Corporation (SLSDC) property that was utilized for upland access to the river was prepared.
- A small shed was placed at the SLSDC property for daily safety meetings.
- Equipment was delivered to the site via tractor-trailer and offloaded using a crane.
- "Marine plants" to be utilized for activated carbon placement were constructed and positioned within the ACPS area.
- Silt curtains and associated anchoring were installed (see Section 3.2.1).

3.2.1 Silt Curtain Installation and Maintenance

As discussed in the Work Plan (Alcoa 2006b), a single L-shaped silt curtain was designed and installed at the project site, as shown on Figure 3-1, to maximize containment of any material that may have been resuspended during application and mixing of the activated carbon with the in-situ surface sediment. The L-shaped configuration included an approximately 200-foot length of curtain situated about 70 to 90 feet downstream of the Initial Testing Area (approximately perpendicular to shore) and then extended approximately 560 feet upstream (parallel to river flow and about 50 feet upstream of the Mixed Tiller Treatment Area). The silt curtain was suspended at the water surface from a series of surface floats and extended down to within about 1 to 2 feet above the river bottom. A total of 95 individual anchors were used to hold the silt curtain in place during construction. Following installation, the silt curtains were visually inspected daily for evidence of damage or movement. However, no evidence of such was observed and no maintenance was required throughout the duration of the project.

3.3 Activated Carbon Placement

As discussed in Section 1.3, the ACPS sub-areas were re-defined during implementation to include the following (see Figure 3-1):

- Initial Testing Area
- Mixed Tiller Treatment Area
- Tine Sled Mixed Treatment Area
- Unmixed Tiller Treatment Area

The process of applying activated carbon within each of these areas is discussed in detail in the following sections. In general, activated carbon applications to the Grasse River sediments included the following steps (see Appendix D for construction photos and Appendix C for process flow diagrams):

- The activated carbon was soaked in pails of water to reduce settling time.
- Activated carbon was added to a mix tank, which was located on one of the marine plants that served as the operating platform for the work, and mixed with water using a pneumatic paddle mixer.
- The activated carbon slurry was pumped to the placement equipment (tiller or tine sled) with adequate pressure and flow rate to prevent solids from settling within the distribution lines.
- The activated carbon slurry was distributed to discharge ports/nozzles within the placement equipment. The distribution system of both pieces of equipment was specifically adjusted, based on the initial Phase 1 land-based testing, to achieve the desired activated carbon application rate.

Approximately 15,000 pounds of bituminous-based activated carbon (product name: Carbsorb 50 x 200 produced by Calgon Carbon Corporation) was initially procured for the ACPS based on the target loading rate of 2.5 percent (dry weight basis). However, as discussed in Section 3.3.5, additional activated carbon was required to complete the ACPS. However, an identical product to that originally procured was not readily available.

Therefore, Calgon supplied a comparable product derived from coconut shells (product name: 050X200-055C-CNS-V000) for the remainder of the ACPS.

3.3.1 Equipment Operation

The following provides a brief summary of the operation of each piece of equipment, the designs for which are discussed in Section 2.1.1. Additional photos illustrating the equipment and operation are presented in Appendix D.

3.3.1.1 Mixed Tiller Application

The enclosed tiller was attached to the arm of a backhoe positioned on a marine plant (i.e., barge with spuds and support equipment). At the attachment with the backhoe, the tiller was equipped with a universal coupling that allowed the operator to control the position of the tiller on three planes of rotation. The marine plant and tiller equipment were outfitted with RTK GPS and an array of sensors (inclinometers and rotational sensors) to measure the position and orientation of the equipment when it was under water. The tiller was also equipped with a turbidity meter that was used for real-time assessment of the settling of material suspended during activated carbon application and/or mixing within the shroud.

The tiller operations were performed from upstream to downstream within the given treatment area, which was subdivided into application cells based on the 7-foot by 12-foot dimensions of the tiller housing and accounting for approximately 6 inches of overlap on all sides of the application cell with adjacent cells. Within each application cell, the excavator set the tiller on the river bottom surface using the GPS/Hypack system, which provided real-time graphical displays of the river bottom bathymetry, the position of the tiller, and the study area to guide the work (Figure 3-2). Once in position, the tiller was engaged and the activated carbon/water slurry was pumped from a mixing tank on the marine plant through a flexible hose to the injection system on the equipment. Following the completion of activated carbon application and mixing with the sediment (see discussion in Section 3.3.4 for mixing durations), the tiller was stopped and the turbidity inside the shroud was monitored to allow for suspended materials to settle before lifting the tiller and repositioning the equipment to the next application cell.

3.3.1.2 Tine Sled Application

Application of activated carbon with the tine sled involved pulling the tine sled from upstream to downstream within "lanes" that were approximately 7 feet wide. Adjacent lanes were overlapped approximately 1 foot on either side to promote complete coverage of the treatment area. Operation of the tine sled required two marine plants, one each positioned at the upstream and downstream ends of the tine sled lane (Figure 3-3). The tine sled was initially placed on the river bottom at the upstream limit of the application lane using a crane located on one of the marine plants. A cable connected to the leading edge of the tine sled was strung along the length of the lane and connected to the hoisting line of the crane on the downstream marine plant. The tow cable was routed through a sheave block attached to the bucket of an excavator also located on downstream marine plant (Figure 3-3). The sheave was lowered to near the bottom of the river to allow a straight pull on the sled. Minor corrections to the tine sled's horizontal position within each lane could be made during the pull by moving the excavator bucket sideways.

Similar to the positioning system described above for the tiller, an RTK GPS system was located on the marine plant for accurate positioning. However, it was not possible to use the inclinometer and rotational sensor system described above with the tine sled for real-time positioning, since the sled was not connected to a fixed backhoe arm. Furthermore, the vertical position could not be accurately controlled without a fixed connection to the backhoe arm. Therefore, the tine sled was outfitted with interchangeable buoyancy tanks (e.g., air-filled steel tanks and small buoys) that could be used to control the vertical position relative to the sediment surface.

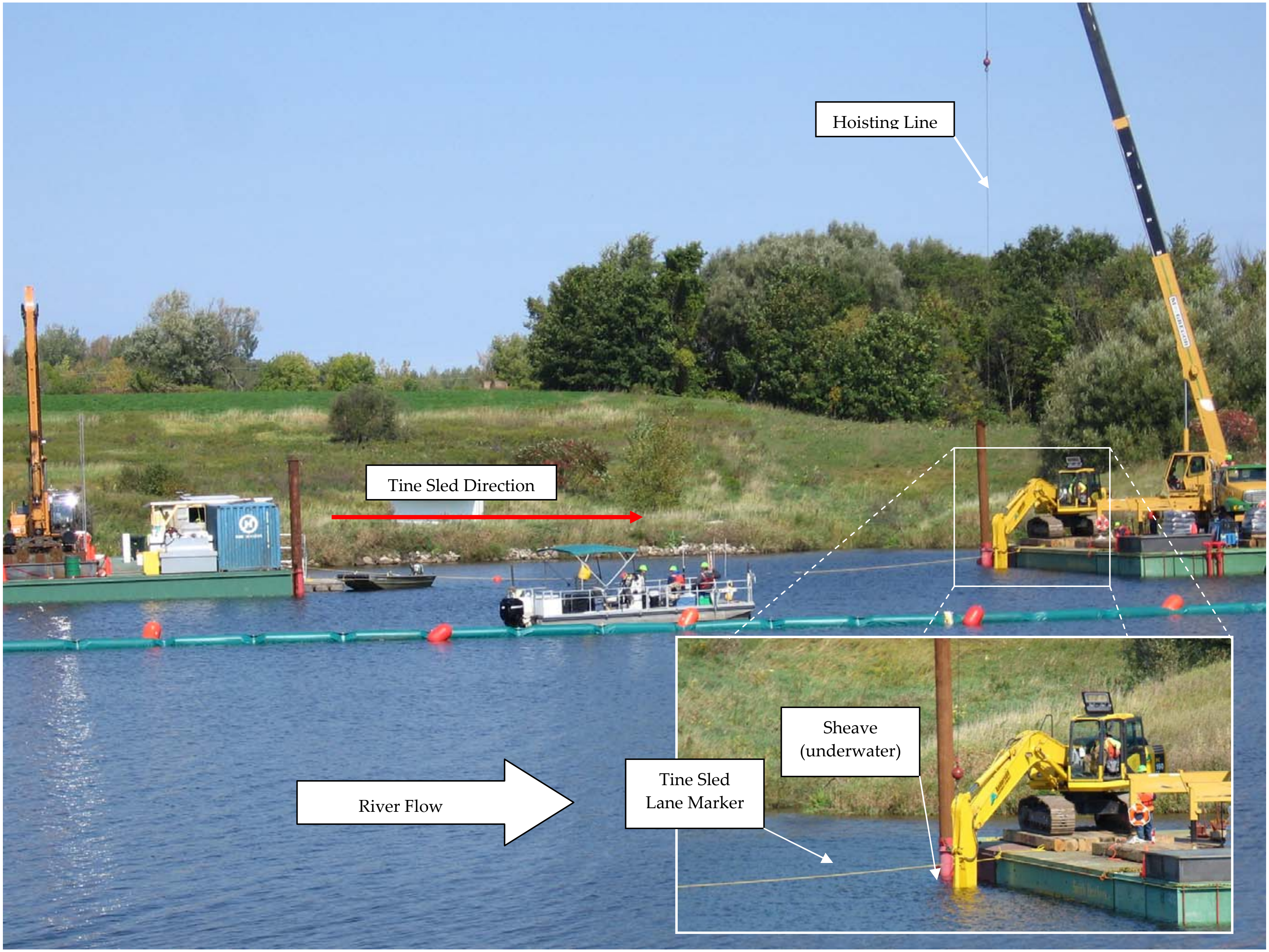


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Figure 3-3
Marine Plant Configuration for Tine Sled Operation

The position of the tine sled was visually monitored by observing vertical poles connected to each corner of the tine sled that extended above the water surface (Figure 3-4). The lateral position of these poles was tracked in relation to a rope tied between the upstream and downstream marine plants indicating the target tine sled lane. These poles were also graduated to monitor the vertical position of the tine sled. In addition to the visual observations, the position of the tine sled was also measured at the beginning, middle, and end of each application lane using the RTK GPS mounted on a survey vessel.

3.3.1.3 Unmixed Tiller Application

The unmixed tiller application was identical to that described for the mixed tiller, except that the mixing devices (wire ropes) were either not engaged or were removed completely from inside the shroud.

Figure 3-4
Vertical Poles Attached to Tine Sled for Visual Position Tracking

3.3.2 Verification of Activated Carbon Placement

Post-application sediment core samples were collected throughout the ACPS to measure the activated carbon dosage rates and to support refinement of the equipment and operations as necessary (see Section 3.3.3). This testing was aimed at rapidly informing field decisions to verify the effectiveness of the various activated carbon application systems described above, and to modify such systems as necessary.

Initially, four methods (two visual and two analytical) were evaluated relative to their ability to provide qualitative and/or quantitative measures of the amount of activated carbon added to the river sediments. Additional details of the sediment sampling and analysis methods are provided in Appendix A. The four methods were:

- Field wash method (visual) – This qualitative method involved homogenizing the sediment sample and adding water to create a slurry. The slurry was allowed to settle for a short time, after which the suspended fine silt and clay were decanted. This decanting process was repeated several times until the majority of the fine-grained particles had been removed, leaving the sand and activated carbon. Several calibrated "standards" were developed in the lab with known amounts of activated carbon and Grasse River sediment for visual comparison in the field. It should be noted that this method was intended to provide a qualitative assessment of the relative amount of activated carbon in post-application samples. The field wash method was performed on aliquot samples, separate from those sent to the laboratory for quantitative testing. Appendix A contains a more detailed discussion of the protocol used for this methodology.
- Field sieve method (visual) – This qualitative method involved similar sample preparation to the field wash method, but rather than decanting the fines, the sample was separated by size using a No. 60 U.S. standard sieve (250 microns). The coarse fraction of the sample was compared to calibrated "standards" prepared using the same methodology in the laboratory with Grasse River sediments. Similar to the field wash method, aliquots evaluated with the field sieve method were separate from those sent for quantitative laboratory analysis. Appendix A contains a more detailed discussion of the protocol used for this methodology.

- TOC testing (analytical) – Sediment samples were sent to NEA for moisture content, bulk density, and TOC testing (Lloyd Kahn method) on an expedited (typically less than 24-hour turn-around) schedule. Post-application samples were compared to baseline samples, as discussed in Section 2.3.5 and Appendix A.
- "Black carbon" chemothermal pre-combustion (BC-T) testing (analytical) – Sediment samples were sent to NEA for BC-T testing on an expedited schedule. This method involved a low-temperature pre-combustion burn phase to remove the natural organic carbon, followed by a high-temperature combustion phase to measure the "black" carbon (primarily in the form of natural and anthropogenic soot, or activated carbon added as part of the ACPS), as discussed in Appendix A.

These four methods were initially evaluated as metrics to inform near real-time decisions for the ACPS implementation; however, as construction proceeded, the visual screening methods proved inconclusive (and were subsequently discontinued) and an analytical issue in the quantification of black carbon levels in sediments using the BC-T method was identified (as discussed in Appendix A). Therefore, TOC testing, because of its greater reliability relative to the other metrics considered, became the primary metric for assessing performance and informing near real-time decisions during construction. However, given the variability in the baseline natural TOC levels in the sediments from the ACPS area, a weight of evidence approach that used multiple comparisons for assessing the amount of activated carbon applied to the sediments was developed. The weight of evidence method was termed the "three method average delta," and represented an average of three methods of evaluating the increase in TOC levels associated with the carbon application (see Appendix A for additional details):

1. Post-Pre Station Delta: location-by-location comparison of pre- and post-application TOC levels for surface sediments (0 to 3 inches)
2. Post-Pre Average Delta: comparison of the post-application surface (0 to 3 inches) sediment TOC level at a particular location to the average surface sediment TOC level for the entire ACPS area determined during baseline monitoring

3. Surface-Deep Delta: comparison of the post-application surface (0 to 3 inches) sediment TOC level at a particular location to the post-application TOC level in the 3- to 6-inch sample interval for the same location

In the absence of a reliable black carbon measurement technique during field implementation, the three method average delta methodology provided a quantitative means by which to evaluate the ability of the application and mixing equipment to deliver activated carbon to the surface sediments and, thus, was used during carbon application to help guide decision making in the field.

As a result of the analytical issues associated with measuring activated carbon within the Grasse River sediments using the BC-T method, representatives from ORD suggested researching alternate methods of measuring the amount of activated carbon applied. This suggestion led to a discussion with several national analytical chemistry experts to identify appropriate alternate testing methods that could be utilized for follow-on verification testing (i.e., following field implementation) of samples collected from the ACPS area. In order to permit post-implementation testing using refined or alternate analytical methods, aliquots of each sample collected during implementation of the ACPS were archived.

Subsequent to completion of the 2006 field implementation activities, UMBC refined and improved a black carbon-chemical pre-oxidation (BC-C) method (see Attachment A-3 of Appendix A), resulting in a more accurate and precise procedure to confirm activated carbon concentrations in Grasse River sediments, relative to TOC and BC-T methods. Subsequently, archived baseline and post-application sediment samples collected between August and October 2006 were analyzed by UMBC using the confirmatory BC-C method, to determine with greater confidence the activated carbon dose achieved by the various application techniques. It should be noted that only a subset of the archived samples were analyzed using BC-C method. These included all of the 5-point composite samples (see Section 3.3.4) as well as select samples from the single point core locations that provided even spatial distribution within the treatment areas. In addition, UMBC conducted microscopy analysis of several samples to evaluate the relative abundance of activated carbon particles and to corroborate the findings from the BC-C testing (See Attachment A-3 of Appendix A).

The following sections discuss the sediment sampling and use of the TOC measurements in each of the activated carbon treatment areas to assess near real-time performance during implementation of the ACPS. In addition, the results of BC-C testing conducted on archived samples following the fall 2006 in-water construction activities are presented as confirmation of the TOC results obtained during implementation. This Construction Documentation Report addresses the sediment sampling from an implementation and construction verification standpoint, whereas future submittals will address interpretation of these and future sampling results from a technology effectiveness perspective.

3.3.3 Initial Testing Area

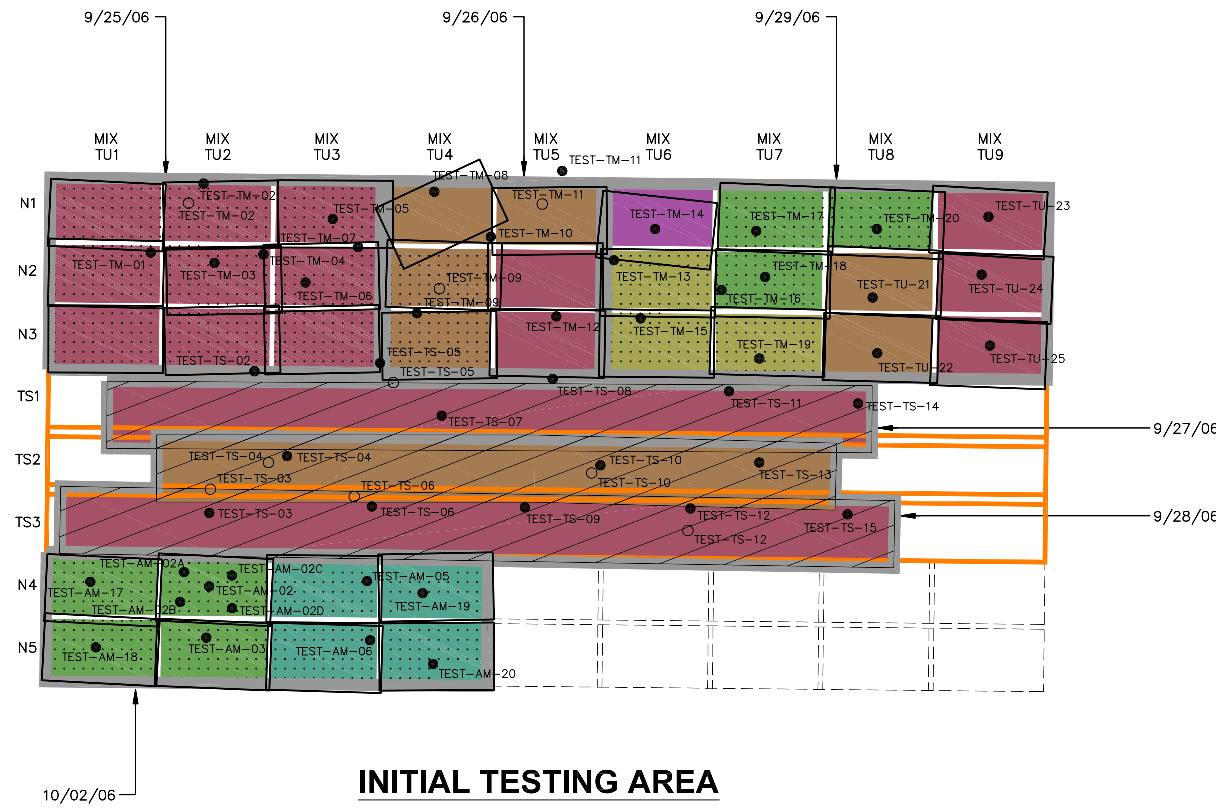
As part of the Phase 2 activities, the performance of both the tiller and tine sled were evaluated in the Initial Testing Area in the Grasse River. The intent of the Initial Testing Area was to refine equipment position and operation procedures necessary to achieve the target dose of activated carbon to be applied in the Mixed and Unmixed Treatment Areas. In addition, the performance of both the tiller and tine sled were to be compared to determine which would be carried forward for use in the Mixed Treatment Area, as described in the Work Plan (Alcoa 2006b). Water column monitoring was conducted throughout the application of activated carbon within the Initial Testing Area, as discussed in Section 3.4.

3.3.3.1 Mixed Tiller Application Testing

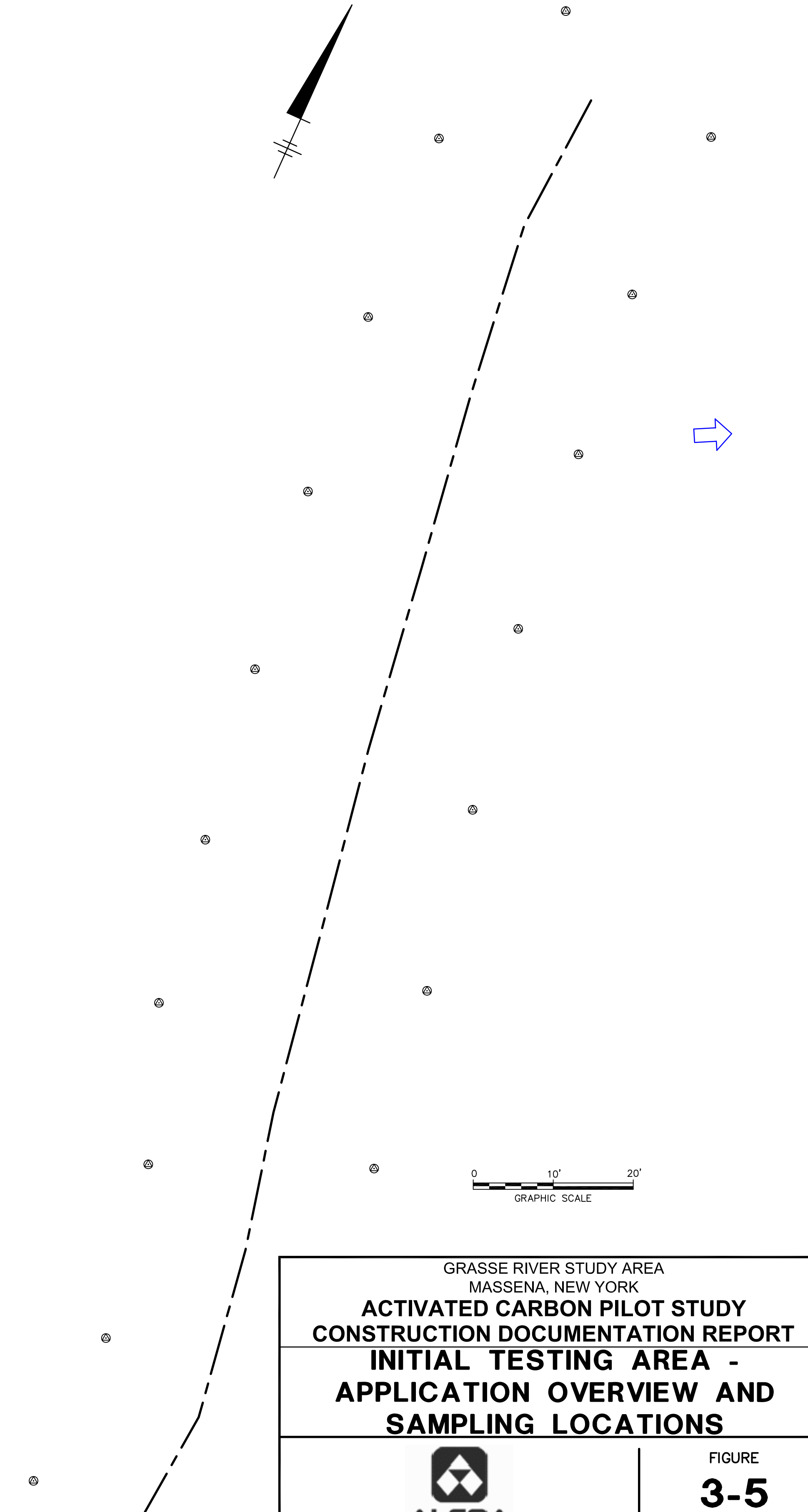
Work within the Initial Testing Area began on September 25, 2006, using the mixed tiller (Figure 3-5). To evaluate performance within the Initial Testing Area, sediment core samples were collected from two locations and segmented into 0- to 3-inch and 3- to 6-inch intervals. Initially, aliquots of the samples were processed using the methodologies described above for visual observations. However, observations of samples collected within the initial mixed tiller application cells were inconclusive due in part to the abundance of organic matter, which ranged widely in size and in some cases masked the visual appearance of the activated carbon. Therefore, 10 sediment cores were collected, processed, and submitted for laboratory analysis from locations sampled during the baseline monitoring. Sampling results from the TOC and BC-T analyses were reviewed within these initial mixed tiller application cells to more accurately quantify the amount of activated carbon applied. Appendix A provides a complete summary of analytical sampling results.

TARGET APPLICATION CELLS/LANES:

- NO CARBON PLACED
- 1x CARBON DOSE, MIXED TILLER
- 2x CARBON DOSE, MIXED TILLER
- 1x CARBON DOSE, MIXED TILLER, 0.3 FEET ABOVE FIELD-CORRECTED SEDIMENT SURFACE
- 2x CARBON DOSE, MIXED TILLER, 0.3 FEET ABOVE FIELD-CORRECTED SEDIMENT SURFACE
- 2x CARBON DOSE, MIXED TILLER, 0.2 FEET ABOVE FIELD-CORRECTED SEDIMENT SURFACE
- 1x CARBON DOSE, UNMIXED TILLER
- 2x CARBON DOSE, UNMIXED TILLER
- 1x CARBON DOSE, UNMIXED TILLER, 1.5 FEET ABOVE FIELD-CORRECTED SEDIMENT SURFACE
- 1x CARBON DOSE, TINE SLED, 10 FEET/MINUTE
- 2x CARBON DOSE, TINE SLED, 5 FEET/MINUTE
- TARGET TINE SLED LANE



INITIAL TESTING AREA



LEGEND:

- APPROXIMATE SILT CURTAIN LOCATION
- SILT CURTAIN ANCHOR LOCATION
- TEST-TM-11 ● SEDIMENT CORE LOCATION (COLLECTED FIRST)
- TEST-TM-11 ○ SEDIMENT CORE LOCATION (COLLECTED SECOND)
- DAILY APPLICATION AREA OUTLINE
- ACTUAL TILLER APPLICATION CELL
- FLOW DIRECTION

NOTES:

1. THE TARGET AND ACTUAL LOCATIONS OF THE TILLER PLACEMENT CELLS AND TINE SLED APPLICATION LANES WERE PROVIDED BY J.F. BRENNAN.
2. THE SINGLE TARGET DOSE OF CARBON (1x) WAS 2.5%; 2x CARBON DOSE IS EQUIVALENT TO A TARGET APPLICATION OF 5%.
3. BITUMINOUS BASED ACID-WASHED ACTIVATED CARBON WAS PLACED IN THIS AREA.
4. APPLICATION CELLS COMPLETED ON 9/25 AND 9/26/06 WERE COMPLETED PRIOR TO "CORRECTION" OF SEDIMENT SURFACE THAT ACCOUNTED FOR DIFFERENCES BETWEEN ACTUAL SEDIMENT SURFACE AND THE BASELINE BATHYMETRIC SURVEY.
5. SETTLING TIME FOR TILLER APPLICATION CELLS IN THIS AREA WAS APPROXIMATELY 10 MINUTES (± 2 MINUTES), EXCEPT FOR TU6-N3 (15 MINUTES) AND TU9-N2 (7 MINUTES).

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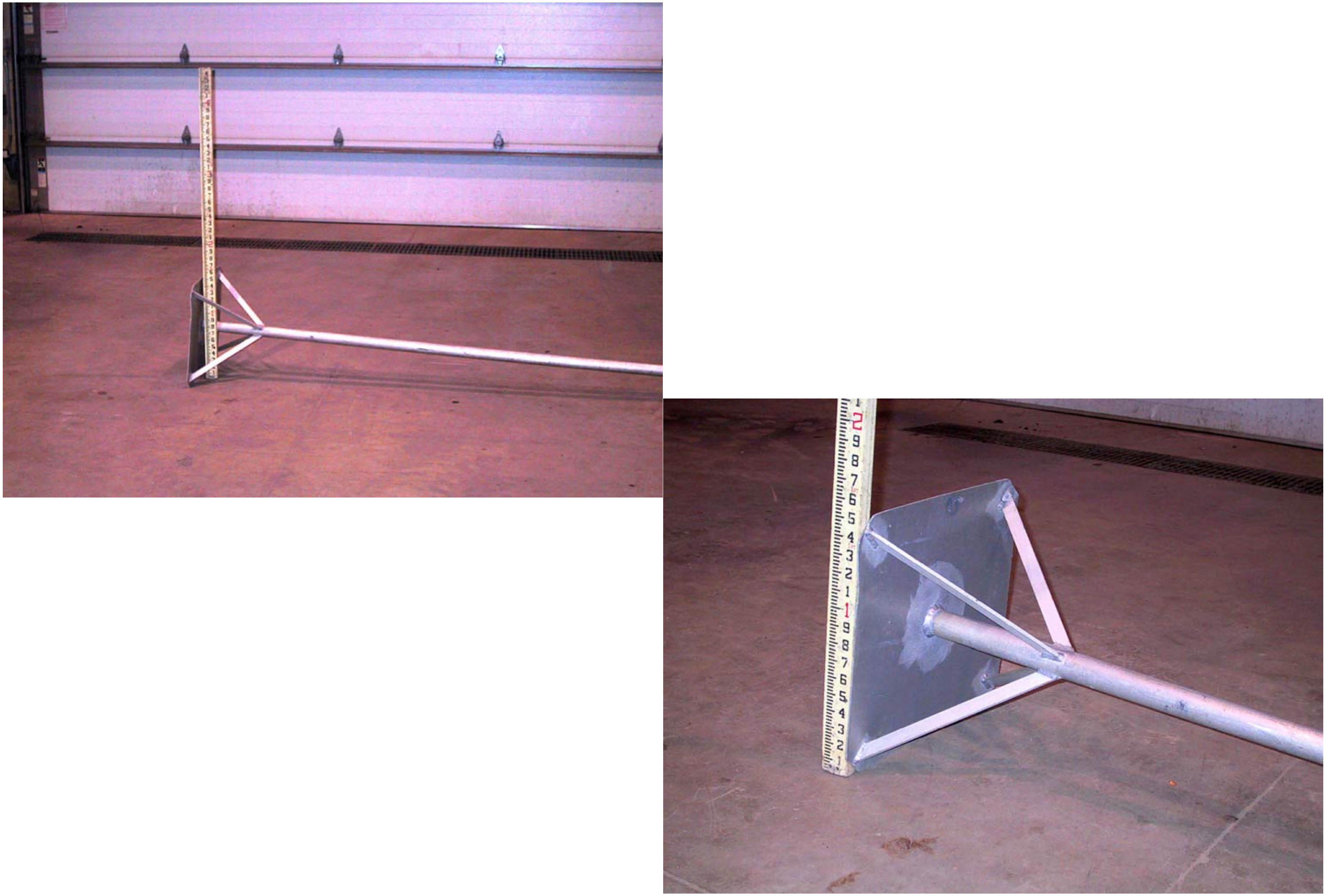
INITIAL TESTING AREA - APPLICATION OVERVIEW AND SAMPLING LOCATIONS

ALCOA

FIGURE **3-5**

The initial TOC and BC-T analytical results collected from the Initial Testing Area indicated that the intended dose of activated carbon was not being consistently achieved within the top 6 inches of the sediment column. Analysis of deeper intervals (6- to 12-inch, 12- to 18-inch, and 18- to 24-inch) revealed that elevated TOC and black carbon concentrations (using BC-T methods) were present in deeper intervals following initial tiller applications.

Based on a review of the available sampling data and initial activated carbon mass balance comparisons, the technical team concluded that imprecise vertical positioning was a primary factor contributing to the less-than-expected dose of activated carbon within the first several tiller application cells (small-scale spatial variability was also identified as an additional complicating factor, and is discussed in Section 3.3.4). Specifically, the pre-construction acoustic bathymetric survey may not have accurately identified the sediment bed elevation within the ACPS area of the Grasse River, as discussed in Section 3.1.4.4. This was subsequently confirmed through manual surveying techniques at several discrete points within a given tiller application cell, which revealed that the pre-construction acoustical survey consistently identified the elevation of the sediment surface as deeper than the "true" soft sediment surface, potentially due to an error in the acoustical survey data. To obtain the actual sediment bed elevation (or field-corrected sediment surface), manual surveying was performed using a graduated survey rod with a large aluminum plate attached to the base (Figure 3-6). The resistance to penetration of this aluminum plate, initially coupled with underwater video observations (see Section 3.4), allowed the surveyor to accurately identify the sediment-water interface. Once the sediment-water interface was identified, the total water depth was determined and the actual sediment bed elevation (or field-corrected sediment surface) was calculated using the difference between the water surface elevation (as recorded using differential global positioning system [DGPS]) and the total water depth.



ALCOA

Figure 3-6
Manual Survey Rod

To correct for identified inaccuracies in the acoustical survey, yet still utilize the RTK GPS/Hypack positioning system, the sediment surface elevation was manually measured in the approximate center of each subsequent tiller application cell (within the Initial Testing Area and the Mixed and Unmixed Tiller Treatment Areas) to determine the field-corrected sediment surface. This surface was compared to the baseline acoustical survey elevation to develop a cell-specific offset to be applied to the bathymetry map visible in the operator's cab.

In addition to the corrections associated with the baseline acoustical survey, the position of the base of the tiller equipment was also varied between 0.2 and 0.3 feet above the field-corrected sediment surface in subsequent application cells to optimize mixing of the activated carbon within the top 4 to 6 inches of sediment. Ultimately, the 0.3-foot offset was selected for all application cells within the Mixed and Unmixed Tiller Treatment Areas based on a review of the initial sediment sampling results relative to the equipment design, specifically the depth of the mixing tines below the base of the tiller housing (i.e., the 0.3-foot offset above the sediment bottom yielded the most effective carbon application/mixing depth). As a result, the cell-specific baseline acoustical survey offset (as described above) was further adjusted by 0.3 feet to obtain the target tiller elevation for carbon application. Appendix G presents a summary of the adjustments to the tiller elevation for each application cell (with any exceptions noted) including the initial baseline acoustical survey elevation, physical measurements, 0.3-foot offset, and the resulting final tiller elevation.

In addition to revisions in the equipment positioning procedures discussed above, other operating parameters were also varied in subsequent mixed tiller applications within the Initial Testing Area, including the activated carbon dose (ranging up to twice the originally calculated dose), mixing speed (ranging from 5 to 7 revolutions per minute [rpm]), and settling time (ranging from 7 to 15 minutes). The variation in operating parameters are summarized in Table 3-1 and indicated on Figure 3-5. The operating parameter trials were performed in an effort to optimize overall operating procedures.

Table 3-1
Summary of Operating Parameters for Mixed Tiller in Initial Testing Area

Operating Parameters Combination	Combination of Operating Parameters [a]		Number of Application Cells
	Carbon Dose [b] (% dry weight)	Offset From Tiller Base to Field-Corrected Sediment Surface (feet)	
1	2.5%	N/A [c]	9
2	5%	N/A [c]	2
3	2.5%	0.3	3
4	5%	0.3	7
5	5%	0.2	4

a. All mixed tiller application cells in the Initial Testing Area competed with a tiller mixing speed of 5 to 7 rpm and an approximately 7 to 15 minute settling time.
b. Target carbon dose based on an assumed mixing depth of 6 inches and average pre-construction sediment density measurements (0.56 g/cm^3).
c. Field-correction of sediment surface not performed prior to discovery of survey inaccuracies.

In order to assess the potential for upstream transport of activated carbon during placement in the Initial Testing Area, a core was collected from the Mixed Tiller Treatment Area (location MTA-1) prior to activated carbon application in this area.

The TOC results for this core were relatively similar throughout the top 2 feet (ranging from 6.1 to 6.4 percent) and were within the range of baseline TOC levels observed in the pilot study area, suggesting that substantive upstream transport of activated carbon during application in the Initial Testing Area and subsequent deposition into the Mixed Tiller Treatment Area was not occurring.

3.3.3.2 Unmixed Tiller Testing

Following review of the first day of mixed tiller testing, the unmixed tiller testing was conducted in the Initial Testing Area. Similar to the mixed tiller testing, operating parameters (including vertical positioning, activated carbon dose, and settling time) were varied, as summarized on Table 3-2 and shown on Figure 3-5, in an effort to determine optimal operating procedures. Sediment sampling was conducted and TOC and BC-T analyses were performed to evaluate the unmixed tiller performance relative to the project objective of achieving a dose of 2.5 percent activated carbon by dry weight within the top 6 inches without mechanical mixing. Similar to the results from the initial mixed tiller application cells, considerable small-scale variability was evident in these initial unmixed tiller applications.

Table 3-2
Summary of Operating Parameters for Unmixed Tiller in Initial Testing Area

Operating Parameters Combination	Combination of Operating Parameters [a]		Number of Application Cells
	Target Carbon Dose (% dry weight) [a]	Offset From Tiller Base to Field-Corrected Sediment Surface (feet)	
1	2.5%	N/A [c]	5
2	5%	N/A [c]	4
3	2.5%	1.5	1

a. All unmixed tiller application cells in the Initial Testing Area competed with approximately 10 minute settling time.

b. Target carbon dose based on an assumed long-term mixing depth of 6 inches and average pre-construction sediment density measurements (0.56 g/cm³).

c. Field-correction of sediment surface not performed prior to discovery of survey inaccuracies.

3.3.3.3 Tine Sled Application Testing

Activated carbon was applied using the tine sled in three application lanes within the Initial Testing Area (see Figure 3-5). Initially, a single dose of activated carbon was applied, based on a target application of 2.5 percent by dry weight, assuming uniform mixing into to the top 6 inches. Application within the second tine sled lane used twice the original dose (i.e., 5 percent by dry weight), towing the tine sled at the same speed (10 feet/minute). This meant that the pump flow was doubled from that originally planned, which created operational inefficiencies in the activated carbon mixing step on the marine plant. In addition, increased back pressure was observed in the activated carbon injection lines indicating that some of the injection nozzles had become plugged. During an inspection of the equipment, it was discovered that over half of the 43 nozzles had become clogged with over-sized activated carbon and other debris. From this point forward, the contractor implemented a system for screening the activated carbon to remove any over-sized particles prior to the pre-soaking step. This screening greatly reduced the clogging problems but occasional clogging occurred in the tine sled and tiller injection systems throughout the ACPS. Therefore, the contractor also implemented a regular inspection and cleaning program for both pieces of equipment (see photos in Appendix D). Following cleaning of the injection nozzles, the second tine sled lane was completed with a slower tow speed (5 feet/minute). For the third tine sled lane, a single dose of activated carbon was applied using the faster tow speed (10 feet/minute) similar to the first application lane, as shown on Table 3-3.

Table 3-3
Summary of Operating Parameters for Tine Sled in Initial Testing Area

Operating Parameters Combination	Combination of Operating Parameters		Number of Applications Lanes
	Carbon Dose [a] (% dry weight)	Tine Sled Tow Speed (feet/min)	
1	2.5%	10	2
2	5%	5	1

a. Target carbon dose based on an assumed mixing depth of 6 inches and average pre-construction sediment density measurements (0.56 g/cm^3).

Similar to the mixed tiller application areas, sediment cores were collected in the tine sled application lanes within the Initial Testing Area. Initial results indicated that the tine sled was able to achieve a similar activated carbon application dose, compared with the mixed tiller.

3.3.3.4 Initial Testing Area Conclusions

The following conclusions resulted from the Initial Testing Area work:

- The use of visual techniques to semi-quantitatively measure the amount of activated carbon present in a post-application sample was too subjective to provide useful information to inform field decisions.
- The nature of the Grasse River sediments necessitated accurate vertical control of the tiller to achieve activated carbon placement within the top 6 inches of existing sediment.
- A combination of the pre-construction acoustical bathymetric survey and manual survey measurements of the sediment surface elevation provided the necessary vertical position accuracy.
- Quality assurance checks of the activated carbon size distribution were required to prevent equipment malfunction due to clogging of the distribution system. This was accommodated in the field by screening the activated carbon to remove over-sized particles and debris.
- Considerable small-scale variability was evident in TOC and black carbon (BC-T) measurements during the initial trials, which limited the ability to develop statistically valid estimates of the delivered activated carbon dose using post-application sediment core data.
- Based on a review of the TOC testing results of post-application sediment cores (see Appendix A), using an activated carbon application rate of 1.5

times the target dose, or 3.75 percent by dry weight assuming uniform mixing over the top 6 inches, appeared to optimize attainment of the ACPS project objectives.

- The standard TOC measurements, when coupled with sediment bulk density measurement and compared to baseline samples at the same location, provided the most useful near-real-time field information regarding the amount of activated carbon applied. As discussed in Section 3.3.2, a "three method average delta" was developed and utilized for interpreting post-application sampling results relative to field decision making.
- Application of activated carbon using the tiller (mixed or unmixed) or tine sled equipment did not exceed water quality criteria (see Section 3.4 for additional details).
- Substantive upstream transport of activated carbon during application in the Initial Testing Area was not occurring.

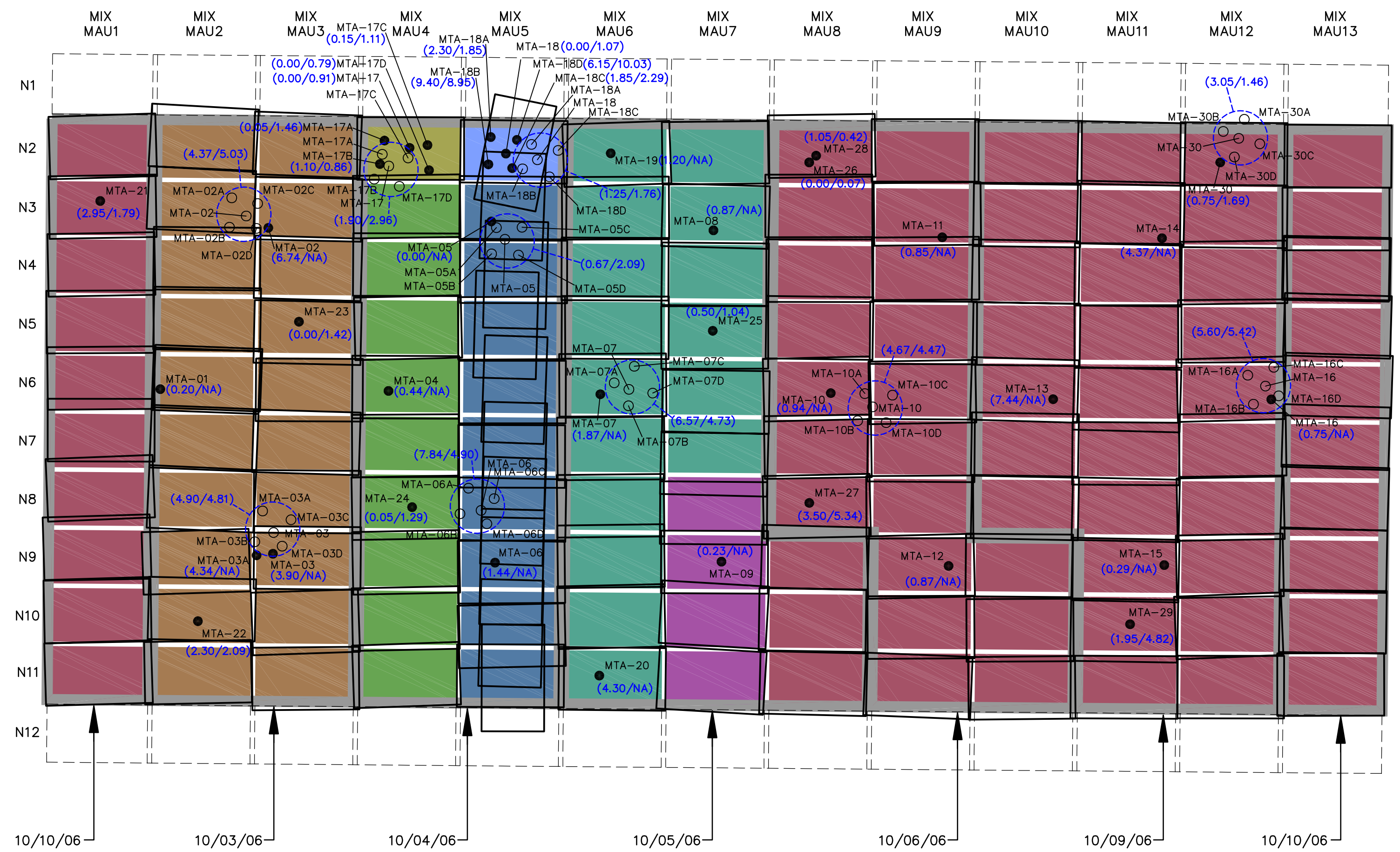
Overall, both the tiller and tine sled performed adequately in the Initial Testing Area, and both pieces of equipment were thus carried forward to the full-scale mixed treatment areas. This change required the study area to be re-defined as discussed in Section 3.1.3 (approved by USEPA as ECN No. 1; see Appendix F).

3.3.4 Mixed Tiller Treatment Area

Following completion of equipment testing and refinement in the Initial Testing Area, the mixed tiller was operated within the Mixed Tiller Treatment Area between October 3 and 10, 2006. Water column monitoring was conducted throughout the application of activated carbon within the Mixed Tiller Treatment Area, as discussed in Section 3.4. As shown on Figure 3-7, the Mixed Tiller Treatment Area was subdivided into 156 application cells based on the dimensions of the tiller and accounting for approximately 6 inches of overlap with adjacent cells. However, due to the higher than expected amount of activated carbon utilized in the Initial Testing Area and the decision to apply a dose of 1.5 times that originally planned for the remainder of the ACPS, the size of the Mixed Tiller Treatment Area was reduced in order to conserve the available activated carbon. The area was reduced by eliminating the row of application cells closest to either river bank, thereby eliminating 26 application cells (Figure 3-7). This revision does not impact the long-term monitoring portion of the ACPS, since none of the pre-determined monitoring locations were within or immediately adjacent to the eliminated application cells.

TARGET TILLER APPLICATION CELLS:

- NO CARBON PLACED
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 4 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 12 TO 15 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT > 12 TO 15 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 12 TO 15 RPM, 10 MINUTE SETTLING TIME, THEN ROTATED TILLER 90 DEGREES ON SAME FOOTPRINT AND REMIXED AT 12 TO 15 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 3 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT > 12 TO 15 RPM, 10 MINUTE SETTLING TIME, THEN ROTATED TILLER 90 DEGREES ON SAME FOOTPRINT AND REMIXED, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 3 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 15 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME, INSPECTED NOZZLES EVERY 5 CELLS



MIXED TILLER TREATMENT AREA

LEGEND:

- ● MTA–03 — SEDIMENT CORE LOCATION (SINGLE POINT)
- ○ MTA–03A — SEDIMENT CORE LOCATION (INDIVIDUAL CORE WITHIN A 5–POINT COMPOSITE SAMPLE; SEE NOTE 4)
- DAILY APPLICATION AREA OUTLINE
- (3.90/NA) — THREE METHOD AVERAGE DELTA/BLACK CARBON (BC–C) INCREASE (%); 0 TO 3–INCH DATA
- 5–POINT COMPOSITE SEDIMENT SAMPLE LOCATION
- ACTUAL TILLER APPLICATION CELL
- FLOW DIRECTION
- NA — NOT ANALYZED

NOTES:

1. THE TARGET AND ACTUAL LOCATIONS OF THE TILLER PLACEMENT CELLS WERE PROVIDED BY J.F. BRENNAN.
2. THE SINGLE TARGET DOSE OF CARBON (1x) WAS 2.5%; 1.5x CARBON DOSE IS EQUIVALENT TO A TARGET APPLICATION OF 3.75%.
3. BITUMINOUS BASED ACID–WASHED ACTIVATED CARBON WAS USED IN THIS APPLICATION AREA.
4. CORE LOCATIONS WITH THE SAME SAMPLE ID FOLLOWED BY A LETTER (A, B, C, D) WERE COMPOSITED BY DEPTH INTERVAL AND SUBMITTED FOR LABORATORY ANALYSIS (UNLESS OTHERWISE INDICATED).
5. DUPLICATE SAMPLE RESULTS ARE AVERAGED IN THE PRESENTED RESULTS.
6. BLACK CARBON RESULTS BASED ON THE BLACK CARBON – CHEMICAL PRE–OXIDATION METHOD AND AN AVERAGE CALCULATED BASELINE OF 0.1%.

0 10' 20'
GRAPHIC SCALE

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MIXED TILLER TREATMENT AREA– APPLICATION OVERVIEW AND SAMPLING LOCATIONS/RESULTS

ALCOA

FIGURE
3-7

Additional optimization of the operating procedures, beyond those from the Initial Testing Area, continued within the Mixed Tiller Treatment Area. This optimization included evaluating eight combinations of various mixing speeds, settling times, and the addition of a second mixing step after rotating the tiller 90 degrees after activated carbon application as summarized on Table 3-4 and shown on Figure 3-7. However, the activated carbon dose was held constant at 3.75 percent (dry weight basis) throughout the Mixed Tiller Treatment Area; applying approximately 8,640 pounds of bituminous-based activated carbon within the treatment area. The relative impact of varying the operating procedures on the achievement of the target dose within the sediment was evaluated through sediment cores and laboratory TOC analysis. As discussed in Section 3.3.2, BC-T analysis of sediment samples was also conducted during implementation, but because of relatively low activated carbon recoveries associated with the BC-T method, field decisions within the Mixed Tiller Treatment Area were based on the three method average delta TOC results. Confirmatory BC-C testing was subsequently performed on aliquots of selected archive samples following implementation to confirm the TOC measurements made immediately after application.

Table 3-4
Summary of Operating Parameters for the Mixed Tiller Treatment Area

Operating Parameters Combination	Combination of Operating Parameters [a]			Number of Applications Cells
	Mixing Speed (rpm)	Post-Application Settling Time (min)	Rotation of Tiller 90 degrees and Remixing (yes/no)	
1	5 to 7	4	No	20
2	12 to 15	10	No	9
3	>15	10	No	1
4	12 to 15	10	Yes	9
5	>15	10	Yes	1
6	5 to 7	10	No	16
7	5 to 7	15	No	4
8 [b]	5 to 7	10	No	70

a. All application cells in the Mixed Tiller Treatment Area completed with an activated carbon dose of 3.75 percent with tiller positioned 0.3 feet above the field-correct sediment surface.
b. Injection nozzles inspected after every 5 application cells.

Initially, sediment coring included collection of a single core within a given application cell. However, to improve the statistical basis of verification sampling, subsequent sampling included collection of multiple discrete cores within an application cell, as well as 5-point composites. These additional data provided a more robust characterization of the variability inherent in the activated carbon application operation. The 5-point composite samples employed a stratified sampling design within a nominal 3-foot by 3-foot sampling grid. Appendix A contains a detailed description of the sediment sampling and analytical results.

The TOC results from sediment cores collected in five of the eight operating parameter areas indicated an average carbon increase close to or exceeding the target increase of 2.5 percent above baseline conditions (2.2 to 3.4 percent). BC-C testing on archived aliquots of these samples yielded similar conclusions, although the increases in black carbon (BC-C) levels due to the application of activated carbon (2.6 to 4.3 percent) were slightly greater than those estimated using the standard TOC three-method average delta metric.

Variation of parameters within those five areas did not result in a significant difference in the amount or distribution of activated carbon applied to the sediments (see Appendix A Table QEA A-7). Therefore, the remainder of the Mixed Tiller Treatment Area was completed with a single set of operating parameters (combination 8 in Table 3-4) that comprised of setting the tiller 0.3 feet above the field-measured sediment surface, operating the tiller at a slow mixing speed (5 to 7 rpm), and allowing 10 minutes of settling time after mixing (Figure 3-7).

Based on the sampling analysis conducted in the Mixed Tiller Treatment Area, the average TOC increases (based on the three method average delta described in Section 3.3.2) achieved in surface sediments (the top 3 inches) across the treatment area are summarized in Table 3-5. Table 3-5 also presents a similar summary based on the confirmatory black carbon testing using the BC-C methodology refined following completion of the fall 2005 construction activities.

Table 3-5
Summary of Activated Carbon Placement in Mixed Tiller Treatment Area

Sample Type	Average Percent Increase	
	TOC by 3-method Avg. Delta (percent increase)	Black Carbon by BC-C method (percent increase)
Single 3-inch-diameter cores (all data)	1.7 ± 0.5 (standard error)	2.5 ± 0.6 (standard error)
5-point core composites (10 samples)	4.1 ± 0.8 (standard error)	3.8 ± 0.5 (standard error)
All samples	2.2 ± 0.4 (standard error) [49 samples]	2.9 ± 0.5 (standard error) [30 samples]

A more than two-fold increase in average TOC was observed using the 5-point composite samples, compared with the single point cores. The BC-C results also indicate a higher average increase in activated carbon measured in the 5-point cores compared with the single point cores. Considering the spacing used to collect the 5-point composites, these data suggest small-scale spatial variability on the order of 3 inches to 2 feet in the initial activated carbon dose achieved by the application equipment. These comparisons also underscore the importance of a statistically-based stratified sampling design to assess overall application rates achieved with the mixed tiller. Importantly, the data from the 5-point composite sampling confirm that the mixed tiller application achieved an average activated carbon dose greater than the 2.5 percent (dry weight basis) target.

3.3.5 Unmixed Tiller Treatment Area

Following completion of activated carbon application using the tiller in the Mixed Tiller Treatment Area, the mixing devices were removed from inside the shroud to prevent interference with activated carbon application in the Unmixed Tiller Treatment Area. The dimensions of the Unmixed Tiller Treatment Area were modified from that in the Work Plan (Alcoa 2006b) to accommodate the addition of the Tine Sled Treatment Area, as approved through ECN No. 1 (see Appendix F).

As discussed in Section 3.1.3 and approved as part of ECN No. 2 (see Appendix F), an alternate source of activated carbon was utilized in the Unmixed Tiller Treatment Area (and the Tine Sled Mixed Treatment Area) due to the unavailability of the same product initially procured and used in the Initial Testing Area and Mixed Tiller Treatment Area.

The coconut shell-based activated carbon used in this area was reported by the manufacturer to have similar properties (identical grain size and similar sorption properties, iodine number, and specific surface area) to the bituminous-based activated carbon (see ECN No. 2 in Appendix F for complete specifications of both activated carbon products). Subsequent to field implementation, separate TOC (Lloyd Kahn method) and black carbon (BC-C method) calibration curves were developed for the bituminous-based and coconut shell-based activated carbon products, respectively, to ensure accurate assessment of post-application sediment samples. The TOC (Lloyd Kahn) of the bituminous-based activated carbon (Carbsorb) was 83.2 percent and the TOC of the coconut shell-based activated carbon was 87.7 percent. The black carbon content (BC-C) of the bituminous-based activated carbon (Carbsorb) was 80.4 percent and the black carbon content of the coconut shell-based activated carbon was 86.6 percent (see Attachment A-3 of Appendix A).

Prior to procuring the coconut shell-based carbon, a technical group meeting was held with Alcoa, the construction management team, and members of the Agency team to verify the suitability of this alternate source for completion of the ACPS. Based on the review of the physical properties and conclusions of the technical group, the source of activated carbon was not expected to adversely impact the long-term performance of the activated carbon to reduce the PCB bioavailability in Grasse River sediments.

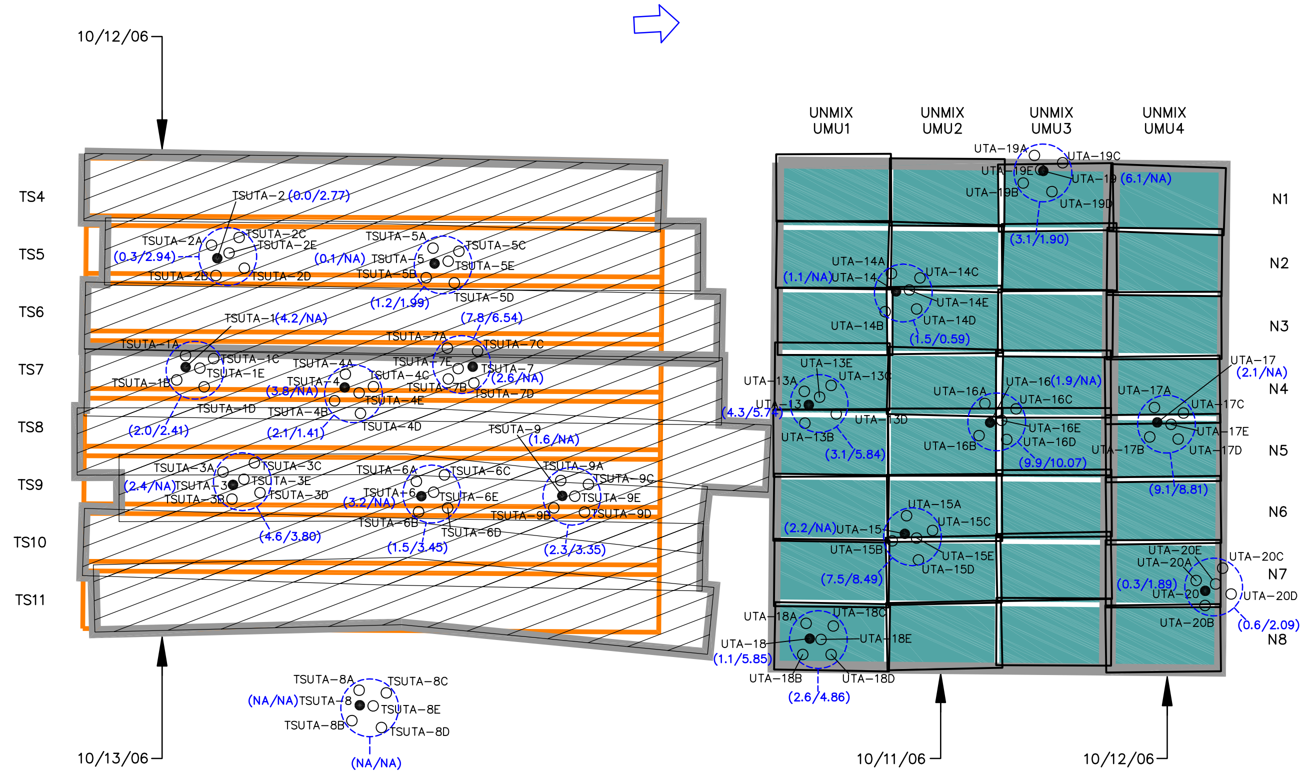
The Unmixed Tiller Treatment Area was subdivided into 32 application cells based on the dimensions of the tiller and accounting for approximately 6 inches of overlap with adjacent cells (Figure 3-8). In total, approximately 2,260 pounds of the coconut shell-based activated carbon were placed in the Unmixed Tiller Treatment Area between October 11 and 12, 2006. Water column monitoring was conducted throughout the application of activated carbon within the Unmixed Tiller Treatment Area, as discussed in Section 3.4.

The same general operating parameters were used in each application cell including applying activated carbon at a dose of 3.75 percent by dry weight (1.5 times the original target), vertical positioning of the tiller approximately 0.3 feet above the field-measured sediment surface, and a 10-minute settling time after activated carbon application and prior to repositioning the equipment.

TARGET APPLICATION CELLS/LANES:

1.5x CARBON DOSE, TILLER UNMIXED, 0.3 FEET ABOVE FIELD-CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME

1.5x CARBON DOSE, TINE SLED, 5 FEET/MINUTE



TINE SLED MIXED TREATMENT AREA

UNMIXED TILLER TREATMENT AREA

LEGEND:

- UTA-18 SEDIMENT CORE LOCATION (SINGLE POINT)
- UTA-18A SEDIMENT CORE LOCATION (INDIVIDUAL CORE WITHIN A 5-POINT COMPOSITE SAMPLE; SEE NOTE 4)
- DAILY APPLICATION AREA OUTLINE
- (3.90/NA) THREE METHOD AVERAGE DELTA/BLACK CARBON (BC-C) INCREASE (%); 0 TO 3-INCH DATA
- 5-POINT COMPOSITE SEDIMENT SAMPLE LOCATION
- ACTUAL TILLER APPLICATION CELL
- TARGET TINE SLED LANE
- FLOW DIRECTION
- NA NOT ANALYZED

NOTES:

1. THE TARGET AND ACTUAL LOCATIONS OF THE TILLER PLACEMENT CELLS AND TINE SLED APPLICATION LANES WERE PROVIDED BY J.F. BRENNAN.
2. THE SINGLE TARGET DOSE OF CARBON (1x) WAS 2.5%; 1.5x CARBON DOSE IS EQUIVALENT TO A TARGET APPLICATION OF 3.75%.
3. COCONUT SHELL-BASED ACTIVATED CARBON WAS USED IN THE TINE SLED MIXED AND UNMIXED TILLER TREATMENT AREAS.
4. CORE LOCATIONS WITH THE SAME SAMPLE ID FOLLOWED BY A LETTER (A, B, C, D, E) WERE COMPOSITED BY DEPTH INTERVAL AND SUBMITTED FOR LABORATORY ANALYSIS.
5. DUPLICATE SAMPLE RESULTS ARE AVERAGED IN THE PRESENTED RESULTS.
6. BLACK CARBON RESULTS BASED ON THE BLACK CARBON – CHEMICAL PRE-OXIDATION METHOD AND AN AVERAGE CALCULATED BASELINE OF 0.1%.

0 10' 20'
GRAPHIC SCALE

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TINE SLED MIXED AND UNMIXED TILLER TREATMENT AREAS - APPLICATION OVERVIEW AND SAMPLING LOCATIONS/RESULTS

ALCOA

FIGURE
3-8

Sediment core samples were collected in eight areas, including eight individual cores as well as 5-point composite cores surrounding each of the eight individual core locations (Figure 3-8). Additional details of the sampling and analysis within the Unmixed Tiller Treatment Area are provided in Appendix A. Based on the sampling analysis conducted in the Unmixed Tiller Treatment Area, the average TOC increases (based on the three method average delta method described in Section 3.3.2) achieved in the surface sediments (top 3 inches) across the treatment area are summarized in Table 3-6. Table 3-6 also presents a similar summary based on the confirmatory black carbon testing using the BC-C methodology refined following completion of the fall 2005 construction activities.

Table 3-6
Summary of Activated Carbon Placement in Unmixed Tiller Treatment Area

	Average Percent Increase	
Sample Type	**TOC by 3-method Avg. Delta (percent increase)**	**Black Carbon by BC-C method (percent increase)**
Single 3-inch-diameter cores	2.4 ± 0.7 (standard error) [8 samples]	4.5 ± 1.6 (standard error) [3 samples]
5-point core composites (8 samples)	4.7 ± 1.4 (standard error)	5.3 ± 1.4 (standard error)
All samples	3.5 ± 0.8 (standard error) [16 samples]	5.1 ± 1.0 (standard error) [11 samples]

Similar to the results in the Mixed Tiller Treatment Area (see Section 3.3.4), a nearly 2-fold increase in average TOC was observed using the 5-point composite samples, compared with the single point cores, further supporting the concept of small-scale spatial variability in the initial activated carbon dose achieved by the application equipment. It should be noted that a similar comparison of single point and 5-point composite cores was not made due to the limited testing of single point samples using the BC-C method. Also consistent with the results for the Mixed Tiller Treatment Area, the unmixed tiller application achieved an average activated carbon dose greater than the 2.5 percent (dry weight basis) target.

3.3.6 Tine Sled Mixed Treatment Area

Based on the performance of the tine sled within the Initial Testing Area, the ACPS study design was modified to accommodate an additional mixed treatment area for additional testing of the tine sled. This modification was discussed with the Agencies and subsequently approved as part of ECN No. 1 (see Appendix F). The Tine Sled Mixed Treatment Area was subdivided into eight overlapping application lanes, as shown on Figure 3-8.

Activated carbon was applied at a dose of 3.75 percent (by dry weight for the top 6 inches) within the Tine Sled Mixed Treatment Area. A total of approximately 2,980 pounds of coconut shell-based activated carbon was applied between October 12 and 13, 2006. As discussed in Sections 3.1.3 and 3.3.5, the activated carbon placed in the Tine Sled Mixed Treatment Area was a coconut shell-based product, which has similar properties to the bituminous-based activated carbon initially procured for the project. Water column monitoring was conducted throughout the application of activated carbon within the Tine Sled Mixed Treatment Area, as discussed in Section 3.4.

The vertical position of the tine sled was measured at the start, middle, and end of each tine sled lane using the graduated vertical poles attached at each corner of the tine sled. The water depth was also measured at the start, middle, and end of each tine sled lane using a survey rod with a large aluminum plate fixed at the base (as described in Section 3.3.1). Comparison of the water depth and depth to the base of the tine sled was used to determine the vertical position of the tine sled relative to the sediment surface. In addition, underwater video monitoring was conducted at three points during application in one of the tine sled lanes, as discussed in Section 3.4.1, to support the surveying measurements. It should be noted that a minor plowing effect was observed on either side of the leading edge of the tine sled through the video observations and some of the water depth surveys. This minor plowing effect may have contributed to the observed difference between water depth and tine sled depth, indicating tine sled settlement.

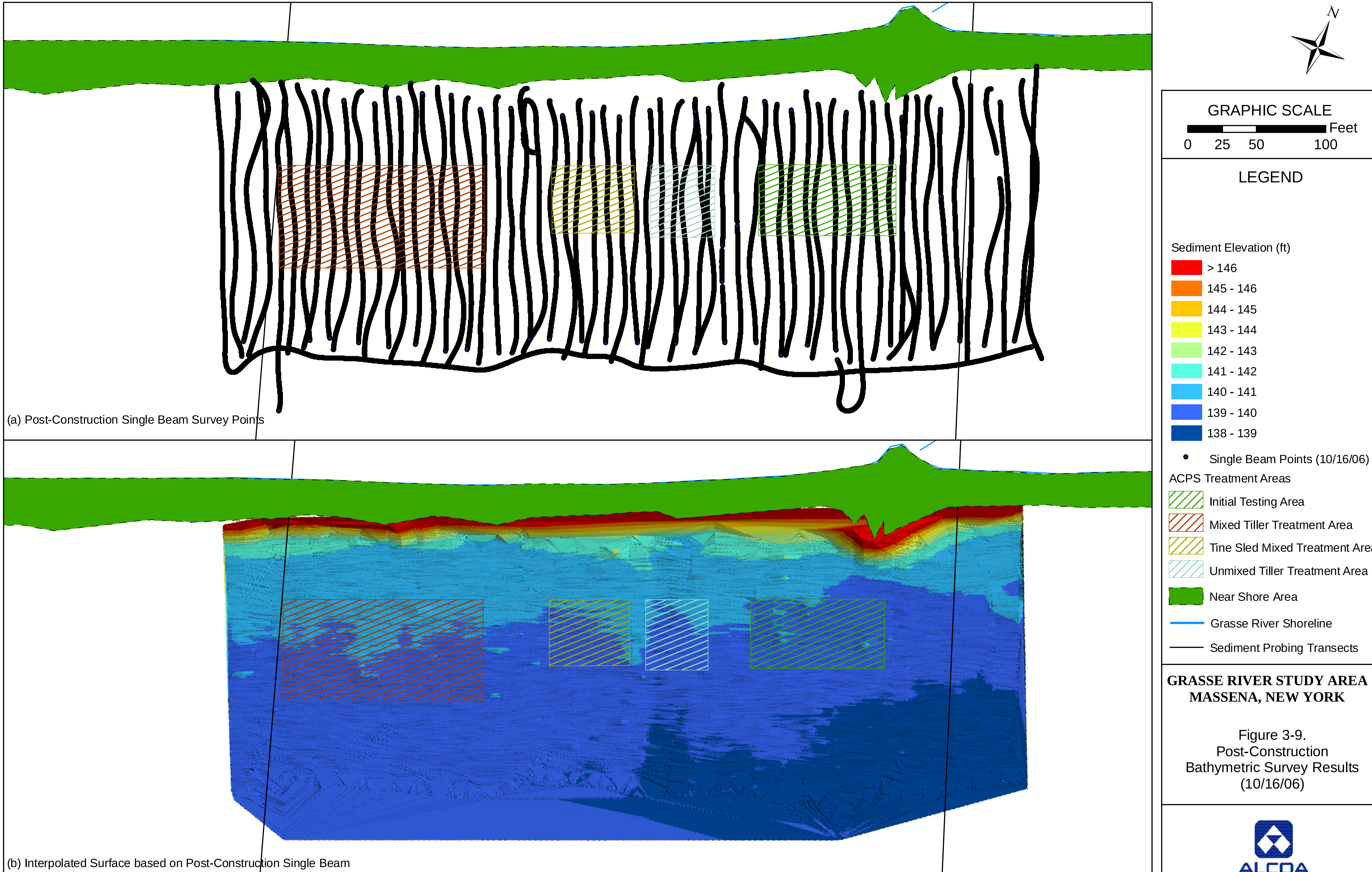
The vertical position measurements were used to optimize the buoyancy adjustments to the tine sled to limit, to the extent possible, the depth to which the tine sled settled under its own weight into the river sediments. Initially, the fabric covering was used in place of the rigid metal covering and two air-filled tanks were attached to the tine sled to reduce the overall buoyant weight of the equipment. Following the completion of the first application lane (TS4) in the Tine Sled Mixed Treatment Area and review of the vertical position measurements (Table 3-7), one small buoy was attached to each corner of the tine sled to increase the buoyancy of the unit. Additional buoyancy adjustments were performed after the second tine sled application (TS5), resulting in the optimal configuration of buoys (three buoys in each of the two front corners and no buoys in the back corners). This configuration was maintained for the remainder of the tine sled applications (TS6 through TS11).

Table 3-7
Depth of Settlement of Tine Sled

Tine Sled Application Lane	Depth of Settlement (feet) Start of Lane	Middle of Lane	End of Lane	Notes
TS4	0.45	0.55	0.2	no buoys
TS5	0.7	0.7	0.4	1 buoy per corner
TS6	0	0.35	0.1	6 buoys front, 0 back
TS7	0.3	0.2	0.5	6 buoys front, 0 back
TS8	0.5	0.8	0.3	6 buoys front, 0 back
TS9	0.4	0.3	0.2	6 buoys front, 0 back
TS10	0.3	0.3	0	6 buoys front, 0 back
TS11	0.3	0.4	0.1	6 buoys front, 0 back
				Total Average
Overall Average	0.37	0.45	0.23	0.35
Average Following Buoy Fine Tuning	0.3	0.4	0.2	0.30

Note: Settlement depth computed as difference between water depth measurement and depth of tine sled measured using poles attached to each corner.

On average, the surveying and video observations indicated that the re-tuned tine sled settled approximately 3 to 4 inches under its own weight upon deployment (prior to initiating the activated carbon application). The measurements also indicated that the tine sled penetrated slightly deeper into the sediments over the first half of the lane and then rose slightly above its original position over the second half of the lane. This conclusion is also supported by the post-construction bathymetric survey conducted over the entire ACPS area (Figure 3-9), which indicates a slight “mounding” of sediment at the downstream end of the Tine Sled Mixed Treatment Area.



GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

Figure 3-9.
Post-Construction
Bathymetric Survey Results
(10/16/06)

ALCOA

Jan 2007

\\Adrianne\D_DRIVE\ALCgra\Analysis\ACPS\GIS\sediment\GAC_split_sediment_061205.mxd

Sediment core samples were collected at nine locations, including nine individual cores as well as 5-point composite cores at each of the nine individual core locations (Figure 3-8). However, samples from station 'TSUTA-8' were collected from outside of the treatment area and, thus, are not representative of treated sediments. For this reason, results from this location are excluded from the summary presented below.

Additional details of the sampling and analysis within the Tine Sled Mixed Treatment Area are provided in Appendix A. Based on the sampling analysis conducted in the Tine Sled Mixed Treatment Area, the average TOC increases (based on the three method average delta method described in Section 3.3.2) achieved in the surface sediments (top 3 inches) across the treatment area are summarized in Table 3-8. Table 3-8 also presents a similar summary based on the confirmatory black carbon testing using the BC-C methodology refined following completion of the fall 2005 construction activities.

Table 3-8
Summary of Activated Carbon Placement in Tine Sled Mixed Treatment Area

Sample Type	Average Percent Increase	
	TOC by 3-method Avg. Delta (percent increase)	Black Carbon by BC-C Method (percent increase)
Single 3-inch-diameter cores	2.0 ± 0.7 (standard error) [8 samples]	2.8 [1 sample]
5-point core composites (8 samples)	2.6 ± 0.9 (standard error)	3.2 ± 0.6 (standard error)
All samples	2.3 ± 0.6 (standard error) [16 samples]	3.2 ± 0.5 (standard error) [9 samples]

The increase in average TOC observed using the 5-point composite samples, compared with the single point cores, was not as significant in the Tine Sled Mixed Treatment Area as in other treatment areas, indicating less small-scale spatial variability inherent with the tine sled application equipment. Similar to the evaluation of the Unmixed Tiller Treatment Area results, a comparison of single point and 5-point composite cores was not made for the Tine Sled Mixed Treatment Area due to the limited testing of single point samples using the BC-C method. However, consistent with the results for the Mixed and Unmixed Tiller Treatment Areas, the tine sled application achieved an average activated carbon dose greater than the 2.5 percent (dry weight basis) target, although not as high as with the mixed or unmixed tiller applications.

3.3.7 Activated Carbon Mass Balance Evaluation

A comparison of the amount of activated carbon applied to that measured after application indicates that although the target dose (2.5 percent by weight) was achieved on average in each of the treatment cells, a portion of the applied carbon remains unaccounted for. On average, approximately 30 to 50 percent of the activated carbon applied to the Grasse River surface sediments was recovered in post-application samples using the BC-C technique (Table 3-9; the timeframe between activated carbon application and sampling ranged from one day to one week [see Appendix A for further detail]). Achievement of the 2.5 percent activated carbon dose in conjunction with the less than 50 percent carbon recovery is primarily attributable to the fact that the original carbon dose was calculated for an assumed mix depth of 6 inches, whereas in the field, the equipment was capable of placing the majority of the carbon in the actual target application zone (upper 3 inches) as described in Section 1.3.2.

Table 3-9
Activated Carbon Loading and Recovery

Activated Carbon Treatment Area	Activated Carbon (kg/m^2) [a]	Activated Carbon Recovery (% of Mass Applied) [b]
Mixed Tiller Treatment Area	1.1 ± 0.2 (std error)	34% ± 5% (std error)
Unmixed Tiller Treatment Area	1.6 ± 0.4 (std error)	49% ± 12% (std error)
Tine Sled Mixed Treatment Area	1.0 ± 0.2 (std error)	32% ± 6% (std error)
ACPS Site Wide	1.2 ± 0.2 (std error)	38% ± 4% (std error)

a. Activated carbon measurements based on 5-point composite samples using BC-C method.
b. Percent recovery based on mass of activated carbon placed as measured on marine plant, average 83.5 percent black carbon content of activated carbon (see Attachment A-3 of Appendix A), and assumed 95 percent solids content of "dry" activated carbon for a total applied mass of activated carbon of 2.16 kg/m^2.

Several potential causes of the less than complete recovery of activated carbon (as measured in sediment samples) were theorized, including the following:

1. **Hypothesis:** A portion of the activated carbon applied to the Grasse River sediments was potentially transported outside of the treatment area.
   Evaluation: Based on an evaluation of water column monitoring results collected during application, and using conservative assumptions (e.g., all suspended solids are activated carbon), it is possible that some fraction of the activated carbon placed in the Grasse River was transported downstream as part of the

suspended load. However, given the relatively low activated carbon application rates, the detection limits of the water column TSS monitoring, and the limited number of water column measurements, the amount of activated carbon potentially suspended in the water column and transported downstream of the ACPS area can not be precisely quantified. Other data collected during the ACPS included underwater video analysis (see Section 3.4.3), particulate carbon analysis of water column samples collected immediately adjacent to the placement equipment (see Section 3.4.1.3), and collection of a core for TOC and BC-T testing from upstream of the activated carbon application area (see Section 3.3.3.1). Evaluation of this data supports the conclusion that a relatively small fraction of the activated carbon was transported outside of the ACPS area. Thus, off-site transport of suspended activated carbon is a potential contributor to incomplete mass recovery, but is not considered a significant cause based on the currently available data. In order to more fully evaluate the potential for transport of activated carbon outside of the treatment areas, Alcoa will collect two 5-point composite cores downstream of the ACPS study area for testing using the BC-C methodology.

2. **Hypothesis:** A percentage of the activated carbon applied to the Grasse River sediments was potentially mixed deeper than 6 inches below the sediment surface. **Evaluation:** A review of the post-application coring data (TOC and BC-C methods) indicates that only a small fraction (less than 1 percent) of activated carbon was measured deeper than 6 inches. Based on the data collected during and immediately following carbon application, this is not considered a significant source of activated carbon loss. However, in order to more fully evaluate the potential for deeper application, Alcoa will collect samples for intervals deeper than 6 inches and perform black carbon testing on selected samples using the chemical oxidation technique (BC-C). This change was documented in ECN No. 5 for Agency review and approval.
3. **Hypothesis:** The delivery of carbon resulted in significant small-scale spatial variability within the sediments, such that even the 5-point composite cores did not recover a significant percentage of the applied activated carbon. **Evaluation:** To evaluate the potential for small-scale spatial variability, the design and operation of the placement equipment (tine sled, mixed tiller, and

unmixed tiller) were reviewed in conjunction with the post-application sampling results (single cores and 5-point composite cores). The following observations are made based on this review:

a. In general, the mixing action of both the roto-tiller and tine sled tend to concentrate the application of carbon in tight bands within the existing sediments. Furthermore, in several instances during application, the activated carbon injection nozzles became clogged with over-sized carbon particles. Although the clogged nozzles were regularly inspected and cleaned, there were times that the equipment was operating with some plugged nozzles that could have further contributed to the uneven distribution of activated carbon.
b. Comparison of the post-application sampling results for the three treatment areas indicates that the unmixed tiller application resulted in the highest average loading (1.6 kg/m^2 versus 1.0 and 1.1 kg/m^2 for the mixed tiller and tine sled, respectively). The unmixed tiller application did not involve a mechanical mixing, which as noted above is a likely cause of the tendency to apply the activated carbon in concentrated bands.
c. The hypothesis of uneven distribution of activated carbon is evident in the comparison of single core samples with 5-point composite samples representative of the same application cell. The 5-point composite samples consistently exhibited a higher mass recovery percentage than the single cores (see Tables 3-5, 3-6, and 3-8). A statistical analysis of the post-application core data appears to partially support the hypothesis of uneven distribution of activated carbon, potentially indicating a "nugget effect." The difference in mass recoveries between single and 5-point composite cores was less pronounced in the Tine Sled Mixed Treatment Area (see Table 3-8), yet the total mass recovered there was the lowest among the treatment areas, indicating that the tine sled may have been less efficient in placing the carbon in the target treatment zone but more efficient in mixing the carbon that did reach this zone.

Based on the evaluation above, it is concluded that small-scale spatial variability in the application of activated carbon is likely a significant contributing factor to the observation of unaccounted mass identified through the post-application sampling results.

3.4 During-Application Monitoring Activities

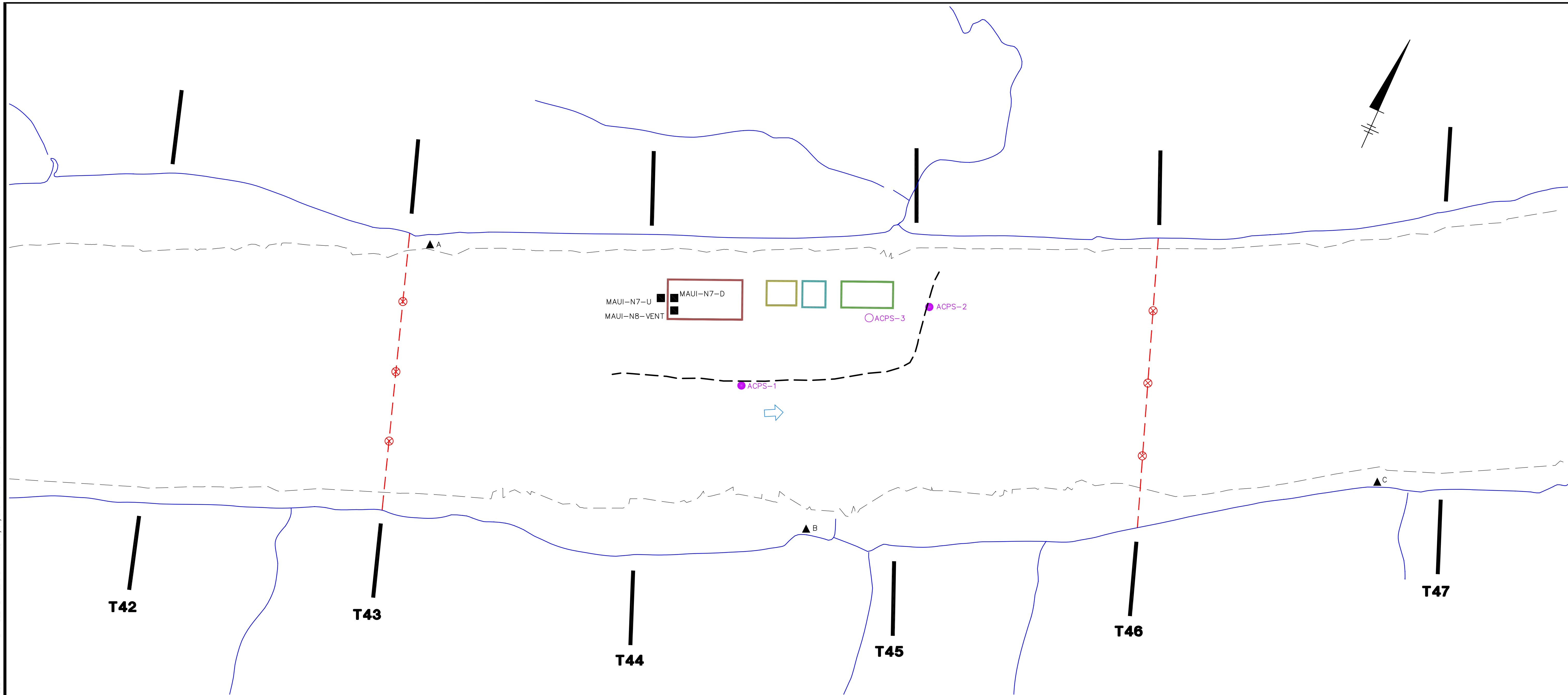
During-application monitoring consisted of water column monitoring, sediment sampling, observation with an underwater video camera, and noise monitoring. Water column (routine) and noise monitoring were performed during all ACPS intrusive in-river activities (i.e., silt curtain installation/removal and activated carbon application) to evaluate potential impacts to the environment during construction. Additional monitoring activities (i.e., sediment sampling, underwater video observation, and supplemental water column monitoring) were conducted to assess the effectiveness of application activities and assist in making real-time decisions regarding the progress of construction activities in the field. Information on the monitoring activities is presented in Sections 3.4.1 through 3.4.4; details of the water column monitoring, sediment sampling, and noise monitoring activities and summaries of results are included in Appendix A.

3.4.1 Water Column Monitoring

Routine and supplemental water column monitoring was conducted during the ACPS to evaluate potential impacts to the environment during construction. Additional information (including all data results) for the water column monitoring events is presented in Appendix A.

3.4.1.1 Routine Water Column Monitoring

Routine water column monitoring activities included monitoring at an upstream and downstream transect as well as three local locations (Figure 3-10). At each location, water column samples and water quality parameters (i.e., water temperature, dissolved oxygen (DO), specific conductivity, pH, and turbidity measurements) were collected at varying depths throughout the water column. Samples were submitted to the Alcoa ChemLab for PCB (Aroclor) and TSS analysis. A turbidity action level of 25 NTUs over background (i.e., upstream transect) was imposed at the downstream transect location; exceedances of this level would result in corrective action measures to reduce turbidity (Table 3-10).



LEGEND:

- T45 — 1992 SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- APPROXIMATE SILT CURTAIN LOCATION
- ROUTINE WATER COLUMN MONITORING TRANSECT (FIXED)
- ACPS-1 — ROUTINE LOCAL PERIMETER WATER COLUMN MONITORING LOCATION (FIXED)
- ACPS-3 — ROUTINE LOCAL INTERIOR WATER COLUMN MONITORING LOCATION (MOBILE LOCATION)
- MAUI-N7-U — SUPPLEMENTAL WATER COLUMN MONITORING LOCATION
- A — APPROXIMATE NOISE MONITORING LOCATION
- FLOW DIRECTION
- TARGET INITIAL TESTING AREA
- TARGET MIXED TILLER TREATMENT AREA
- TARGET UNMIXED TILLER TREATMENT AREA
- TARGET TINE SLED MIXED TREATMENT AREA

NOTE:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

0 100' 200'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY
CONSTRUCTION DOCUMENTATION REPORT

WATER COLUMN AND NOISE MONITORING LOCATIONS

ALCOA

FIGURE
3-10

Table 3-10
2006 ACPS Average Water Column Results by Application

Date Sampled	Application	Average Total Suspended Solids (mg/L)					Average Turbidity (NTU)				
		Upstream	Local			Downstream	Upstream	Local			Downstream
		WCT-43	ACPS-1	ACPS-2	ACPS-3[c]	WCT-46	WCT-43	ACPS-1	ACPS-2	ACPS-3[c]	WCT-46
9/25-10/2	Initial Testing	1.1 (ND-2.0)	2.3 (ND-3.6)	2.4 (ND-4.0)	2.7 (ND-4.4)	2.8 (1.2-4.4)	2.0 (0.3-2.9)	2.6 (0.6-3.8)	2.6 (0.5-4.1)	2.4 (0.5-4.1	2.3 (0.4-3.6)
10/3-10/10	Mixed Tiller	1.3 (ND-3.2)	2.3 (1.6-2.8)	2.1 (ND-3.2)	2.3 (ND-4.4)	1.9 (ND-2.4)	0.9 (0.4-1.3)	1.1 (0.6-1.5)	1.3 (0.6-1.8)	1.3 (0.9-1.9)	1.0 (0.4-1.4)
10/11	Unmixed Tiller	ND	ND	1.6	2.0	1.6	1.3	1.3	1.5	1.5	1.5
10/12	Unmixed Tiller and Tine Sled	2.4	2.0	2.0	5.2	3.2 4.4 (2.0)	0.9	1.1	1.5	2.1	1.3
10/13	Tine Sled	1.6	1.6	5.2	4.0	ND	2.0	1.8	2.3	2.2	2.0

a Range of values are shown in parenthesis.
b 'ND' = Non-Detect
c Local station 'ACPS-3' is located inside the silt curtain.

The following observations resulted from the routine water column monitoring activities.

- PCB levels at the upstream, local, and downstream locations remained below the detection limit (0.065 µg/L [microgram per liter] per Aroclor) throughout the entire ACPS.
- Turbidity levels remained relatively low during activated carbon application.
  - Initial Testing Area: Average turbidity levels measured inside of, adjacent to, and downstream of the silt curtains were similar (2.3 to 2.6 NTU) and slightly higher than average levels measured at the upstream monitoring location (2.0 NTU).
  - Mixed Tiller Treatment Area: Turbidity levels were comparable at the upstream and downstream transects (average levels of 0.9 and 1.0 NTU, respectively), and slightly higher levels at the local monitoring stations (1.1 and 1.3 NTU inside the curtain; 1.3 NTU outside the curtain).
  - Tine Sled Mixed Treatment Area: Turbidity levels (as measured during one sampling event) were 2.0 NTU at both the upstream and downstream locations, 1.8 and 2.3 NTU just outside the silt curtain, and 2.2 NTU inside the curtain.
  - Unmixed Tiller Treatment Area: Turbidity levels (as measured during one sampling event) at the upstream location and the most upstream local monitoring station were 1.3 NTU, while those measured inside of and downstream of the silt curtains were only slightly higher (1.5 NTU).
  - The turbidity action level (25 NTUs above background) was not exceeded during activated carbon application in the pilot study area.
- Similar to turbidity monitoring results, solids levels (as measured by TSS) remained relatively low at all locations throughout activated carbon application activities. Based on previous TSS studies, TSS levels remain relatively low, even under higher flow conditions, and would not be expected to increase appreciably over the range of flows encountered during the ACPS construction (Alcoa 2001).
  - Initial Testing Area: TSS levels upstream of the silt curtains averaged about 1.1 milligrams per liter (mg/L). Overall, TSS levels measured inside of, adjacent to, and downstream of the silt curtains averaged between 2.3

to 2.8 mg/L. The consistent increase in solids levels at these locations indicates that, although minor, some release of solids occurred during application.

- The highest TSS levels were, in most instances, observed during the first 2 days of application and were likely due to an error in the vertical positioning of the tiller relative to the sediment surface (see Section 3.1.3 for details). The correction of the vertical location of the tiller contributed to the lower TSS levels that were observed at the local and downstream locations after the first 2 days of operation.
- Dilution of solids from the increased river flows also contributed to the observed decline in TSS levels over this period.

- Mixed Tiller Treatment Area: TSS levels measured at the upstream monitoring location averaged 1.3 mg/L, and levels at the local monitoring stations were generally higher and exhibited a continual increase during activated carbon application. TSS levels at these locations averaged between 2.1 and 2.3 mg/L. TSS levels at the downstream monitoring location were slightly lower than those measured at the local stations, but elevated relative to upstream (average of 1.9 mg/L).
- Tine Sled Mixed Treatment Area: TSS levels (monitored during one sampling event) measured inside and immediately downstream of the silt curtain were 4.0 mg/L and 5.2 mg/L, respectively. These levels were higher than those measured at all other monitoring locations (1.6 mg/L at the upstream station, 1.6 mg/L at the most upstream local monitoring station, and non-detect downstream).
- Unmixed Tiller Treatment Area: TSS levels (monitored during one sampling event) were below the detection limit at the upstream monitoring location, as well as the most upstream local monitoring station. The highest TSS levels of 2.0 mg/L were measured inside the silt curtain, while the levels measured immediately outside the curtain (at ACPS-2) and at the downstream location were slightly lower (1.6 mg/L).

- The cause for the slight increase noted in TSS but not a corresponding increase in turbidity is uncertain. It is possible that this difference is related to the nature of the activated carbon placed during the study, but the available data are insufficient to properly ascribe the difference to a single factor.

3.4.1.2 Supplemental Water Column Monitoring

Supplemental water column monitoring included the collection of additional water quality parameter data and water column samples. Specifically, additional turbidity measurements were collected on a "continuous" basis and water column samples were collected for particulate organic carbon (POC) and TSS analyses to provide additional data as a basis for real-time decision making in the field and understand impacts to the surrounding environment from activated carbon application.

Turbidity readings were obtained on a frequent basis (i.e., every 30 seconds to every minute [up to every 5 minutes] depending on the activity) during the first few days of activated carbon application in the Initial Testing Area to evaluate potential water quality impacts resulting from activated carbon placement activities. Readings were collected immediately prior to and during activated carbon application in the Initial Testing Area. Readings were collected from 0.8 times the total water column depth upstream and downstream of the tiller and downstream of the tine sled, all within the silt curtain. Turbidity monitoring results during activated carbon application in the mixed tiller application cells averaged 3.1 NTU (baseline reading averaged 3.3 NTU), and turbidity monitoring conducted during tine sled application averaged 3.3 NTU, indicating little to no impacts to the water column due to activated carbon application.

As a result of increased TSS levels inside of, adjacent to, and downstream of the silt curtains observed during routine water column monitoring, supplemental POC sampling was performed during placement in the Mixed Tiller Area at the routine water column monitoring locations (see Figure 3-10) to evaluate whether the increased TSS levels measured downstream were the result of activated carbon loss to the water column during application. The POC levels measured inside of and adjacent to the silt curtains were slightly higher than that measured at the upstream location (0.29 to 0.40 mg/L compared to 0.28 mg/L upstream). The POC concentration measured at the downstream location was 0.22 mg/L.

In addition, TSS and POC water samples were collected upstream and downstream of the tiller, and from the vent of the tiller unit during application of activated carbon in the Mixed Tiller Treatment Area. The TSS levels measured at these locations were similar to or slightly higher than those measured at the routine local monitoring stations on the same day (range of 2.0 to 3.6 mg/L compared to 2.0 to 2.5 mg/L at the local stations). POC levels exhibited no consistent spatial pattern, and ranged from 0.38 to 0.54 mg/L. The POC measurements from both the routine monitoring locations and in the immediate vicinity of the tiller were comparable to those measured in this reach of the river during prior years (0.23 to 0.59 mg/L; 1996 to 1999). This, coupled with the additional TSS data, suggest that the loss of activated carbon to the water column during application in the Mixed Tiller Treatment Area was not significant.

3.4.2 Sediment Sampling

Sediment sampling was conducted throughout the pilot study to verify application of the activated carbon within the targeted placement areas, as well as to assess the amount of activated carbon present. Sediment cores were collected for both visual assessment and laboratory analysis during implementation of the ACPS. Resulting data were used to assist in making real-time field decisions to direct the progress of construction activities. As such, these sediment sampling activities are described as appropriate in Section 3.3, and details on sampling methodology and results are presented in Appendix A.

3.4.3 Underwater Video Observation

Underwater video observation was performed during activated carbon application activities to provide real-time visual evidence of activated carbon application to the sediment and also to supplement analytical data. Underwater video monitoring was conducted via boat using an underwater video camera. The camera was extended through the water column and positioned in close proximity to the object to be recorded. The camera was used to record the activated carbon application process in the Initial Testing Area, and the Mixed Tiller and Tine Sled Mixed Treatment Areas. Representative video coverage is included in Appendix H.

Initial video observations of the tiller application conducted within the Initial Testing Area indicated that the equipment was penetrating several inches to 1 foot into the sediments. These observations were later confirmed by carbon testing of sediment samples collected from depths up to 18 inches, as discussed in Section 3.3. Furthermore, these video observations revealed that the bathymetric survey conducted prior to the work may not have accurately identified the exact elevation of the sediment surface, potentially due to an error with the pre-construction survey data, as discussed in Section 2.2.

Additional video observation of the tiller application within the Initial Testing and Mixed Tiller Treatment Areas indicated delivery of the activated carbon through the distribution system and to the sediment surface. In general, little activated carbon was observed to be escaping the intended application area during application with the tiller in either the mixed or unmixed application. Furthermore, the underwater video footage indicated that turbidity generated by the tiller mixing operation was very minor even within a few feet of the enclosing shroud (also confirmed by video taping at/near the tiller vent). This observation verified the turbidity measurements collected with the water quality meter in the immediate vicinity of the placement equipment.

The underwater camera was also used to observe the positioning of the tine sled within the Tine Sled Mixed Treatment Area. Due to the need to keep the camera relatively stationary during taping, it was not possible to fully capture the movement of the tine sled as it progressed across the river bed. Coverage of the time sled as it was set in a stationary position prior to pulling indicated that the sled was positioned a few inches into the sediment, as discussed in Section 3.3.6. In addition, video observations at the midpoint and end of the tine sled lane indicated a minor plowing effect resulting in mounding of up to several inches of sediment on either side of the leading edge of the tine sled.

Underwater video coverage was obtained during collection of a sediment core in the Mixed Tiller Treatment Area following activated carbon application. Results of this event indicated the ability to successfully capture activated carbon within the core tube during collection; that is, the activated carbon was readily apparent on and below the sediment surface of the core once the core was retrieved from the sediment bed (Figure 3-11).

Figure 3-11 Underwater Video Image During Collection of a Sediment Core

Underwater video observations were also conducted to evaluate the stability of activated carbon placed on the sediment surface during ambient flow conditions as well as during the propagation of the pressure wave that typically forms following the opening of the Snell Lock near the confluence of the Grasse and St. Lawrence Rivers. These observations indicated that activated carbon was stable on the river bottom under both sets of hydrodynamic conditions.

3.4.4 Noise Monitoring

Noise levels were monitored during construction activities to assess noise levels associated with heavy equipment usage and to evaluate any potential impacts to the surrounding community. Noise was monitored at three locations along the northern and southern shorelines adjacent to the closest residential receptors (see Figure 3-10). All noise levels measured throughout the course of the construction activities were comparable to those measured during baseline monitoring. Additional details regarding the noise monitoring and corresponding results are included in Appendix A.

3.5 Demobilization

Demobilization activities included the removal and decontamination or disposal of all construction equipment, support facilities, and waste associated with the ACPS. Demobilization activities began with the removal of the most upstream 100-foot-long section of silt curtain and associated anchors on October 11, 2006, following completion of all work in the Mixed Tiller Treatment Area, as verbally approved by USEPA. No other demobilization activities occurred until completion of all activated carbon placement activities (i.e., following completion of application in the Tine Sled Mixed Treatment Area). Silt curtain and anchor removal resumed on October 13, 2006, and was completed on October 16, 2006. Silt curtains were rinsed, folded, bound, and transported to an on-site storage location for potential future use by Alcoa. Silt curtain anchors were retrieved, rinsed, and stored on-site for potential future use by Alcoa.

3.5.1 Equipment Decontamination

All equipment that either came in contact with the river sediments or was located within the exclusion zone on the marine plant was decontaminated. This included the tine sled, tiller, and the two containers positioned on the marine plants for storing the equipment while not in use. Following decontamination, PCB wipe testing was conducted and samples were sent to the Alcoa ChemLab for PCB Aroclor analysis. Wipe test results with a total PCB concentration (sum of Aroclors) of less than 10.0 µg per 100 square centimeters were deemed "passing" and acceptable for release. The results of all four wipe tests (Table 3-11) indicated that the equipment was suitable for release.

Table 3-11
PCB Wipe Test Results

Item	Total PCBs ($\mu g/100\ cm^2$)
Tine sled	<0.7 [a]
Tiller	<0.7 [a]
Tiller storage box	<0.7 [a]
Tine sled storage box	<0.7 [a]

a Results for all seven PCB Aroclors tested were below the detection limit of 0.1 $\mu g/100\ cm^2$

3.5.2 Equipment Demobilization

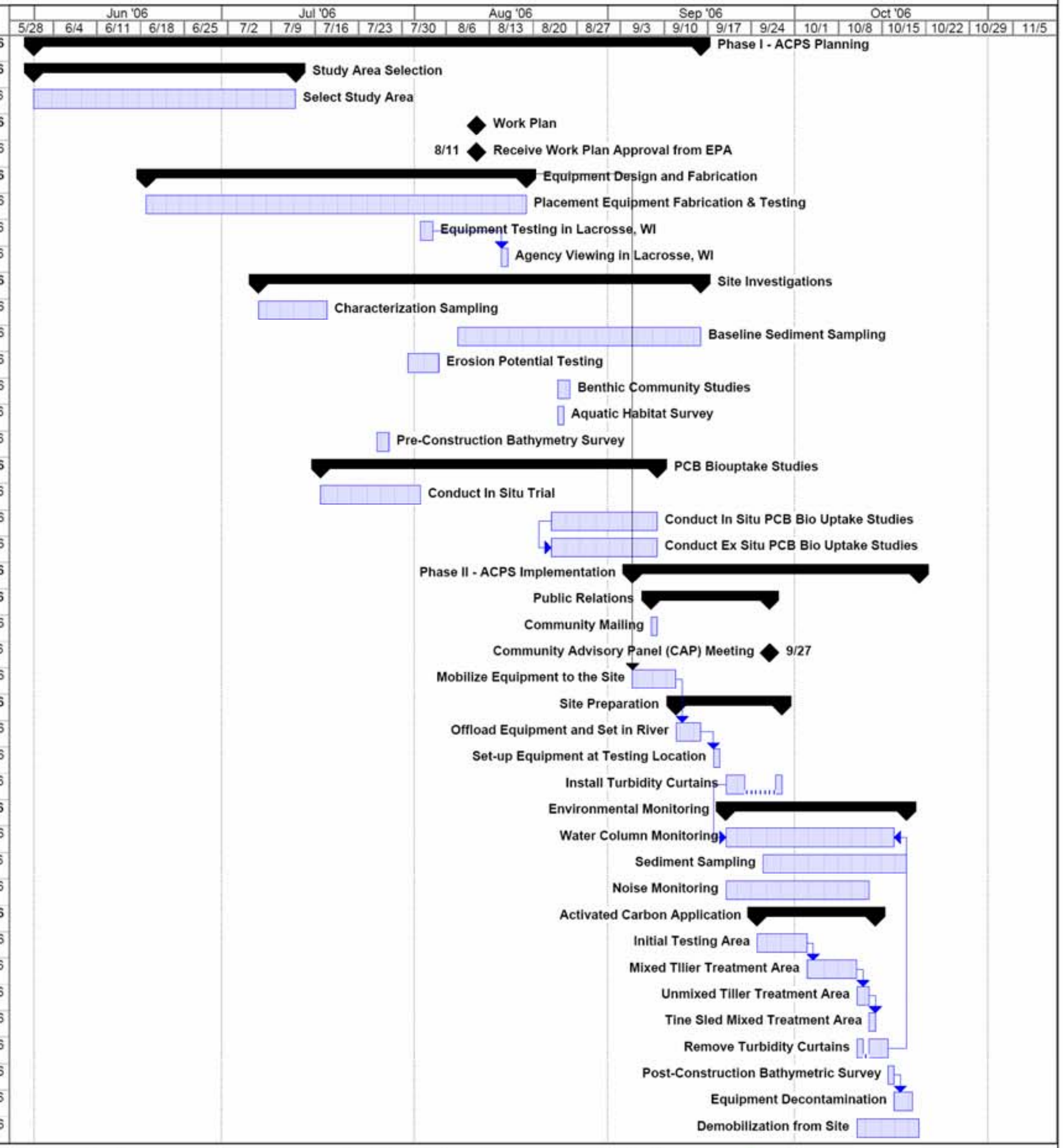
Following decontamination, all marine plant equipment and support equipment that was mobilized to the site in September 2006 was loaded onto tractor-trailers suing a crane and removed from the SLSDC site.

3.6 ACPS Schedule

Figure 3-12 presents the schedule for the ACPS as implemented in the field through the completion of in-river construction activities in October 2006. Long term monitoring plans are discussed in Section 5.

Grasse River Activated Carbon Pilot Study Implemented Schedule

ID	Task Name	Duration	Start	Finish
1	**Phase I - ACPS Planning**	**77 days**	**Thu 6/1/06**	**Fri 9/15/06**
2	Study Area Selection	**30 days**	**Thu 6/1/06**	**Wed 7/12/06**
3	Select Study Area	6 wks	Thu 6/1/06	Wed 7/12/06
4	Work Plan	**0 days**	**Fri 8/11/06**	**Fri 8/11/06**
5	Receive Work Plan Approval from EPA	0 days	Fri 8/11/06	Fri 8/11/06
6	Equipment Design and Fabrication	**45 days**	**Mon 6/19/06**	**Fri 8/18/06**
7	Placement Equipment Fabrication & Testing	9 wks	Mon 6/19/06	Fri 8/18/06
8	Equipment Testing in Lacrosse, WI	2 days	Wed 8/2/06	Thu 8/3/06
9	Agency Viewing in Lacrosse, WI	1 day	Tue 8/15/06	Tue 8/15/06
10	Site Investigations	**51 days**	**Fri 7/7/06**	**Fri 9/15/06**
11	Characterization Sampling	7 days	Fri 7/7/06	Mon 7/17/06
12	Baseline Sediment Sampling	29 days	Tue 8/8/06	Fri 9/15/06
13	Erosion Potential Testing	1 wk	Mon 7/31/06	Fri 8/4/06
14	Benthic Community Studies	2 days	Thu 8/24/06	Fri 8/25/06
15	Aquatic Habitat Survey	1 day	Thu 8/24/06	Thu 8/24/06
16	Pre-Construction Bathymetry Survey	2 days	Wed 7/26/06	Thu 7/27/06
17	PCB Biouptake Studies	**40 days**	**Mon 7/17/06**	**Fri 9/8/06**
18	Conduct In Situ Trial	12 days	Mon 7/17/06	Tue 8/1/06
19	Conduct In Situ PCB Bio Uptake Studies	13 days	Wed 8/23/06	Fri 9/8/06
20	Conduct Ex Situ PCB Bio Uptake Studies	13 days	Wed 8/23/06	Fri 9/8/06
21	**Phase II - ACPS Implementation**	**35 days**	**Tue 9/5/06**	**Fri 10/20/06**
22	**Public Relations**	**13 days**	**Fri 9/8/06**	**Wed 9/27/06**
23	Community Mailing	1 day	Fri 9/8/06	Fri 9/8/06
24	Community Advisory Panel (CAP) Meeting	0 days	Wed 9/27/06	Wed 9/27/06
25	Mobilize Equipment to the Site	5 days	Tue 9/5/06	Mon 9/11/06
26	**Site Preparation**	**13 days**	**Tue 9/12/06**	**Thu 9/28/06**
27	Offload Equipment and Set in River	4 days	Tue 9/12/06	Fri 9/15/06
28	Set-up Equipment at Testing Location	1 day	Mon 9/18/06	Mon 9/18/06
29	Install Turbidity Curtains	4 days	Wed 9/20/06	Thu 9/28/06
30	**Environmental Monitoring**	**22 days**	**Wed 9/20/06**	**Wed 10/18/06**
31	Water Column Monitoring	4 wks	Wed 9/20/06	Mon 10/16/06
32	Sediment Sampling	18 days	Tue 9/26/06	Wed 10/18/06
33	Noise Monitoring	17 days	Wed 9/20/06	Thu 10/12/06
34	**Activated Carbon Application**	**15 days**	**Mon 9/25/06**	**Fri 10/13/06**
35	Initial Testing Area	6 days	Mon 9/25/06	Mon 10/2/06
36	Mixed Tllier Treatment Area	6 days	Tue 10/3/06	Tue 10/10/06
37	Unmixed Tiller Treatment Area	2 days	Wed 10/11/06	Thu 10/12/06
38	Tine Sled Mixed Treatment Area	1 eday	Thu 10/12/06	Fri 10/13/06
39	Remove Turbidity Curtains	5 edays	Wed 10/11/06	Mon 10/16/06
40	Post-Construction Bathymetric Survey	1 day	Mon 10/16/06	Mon 10/16/06
41	Equipment Decontamination	3 days	Tue 10/17/06	Thu 10/19/06
42	Demobilization from Site	9 days	Wed 10/11/06	Fri 10/20/06



Project: Implemented Schedule_12-18 Date: Mon 5/21/07	Task		Progress		Summary		External Tasks		Deadline
	Split		Milestone		Project Summary		External Milestone		

Figure 3-12
ACPS Implemented Schedule

4 FINDINGS

As discussed in Section 1.2, the primary objective relative to the in-river construction portion of the ACPS was to evaluate the ability to apply activated carbon to the existing sediments and monitor the impacts to water quality during application. Additional project objectives focus on the effectiveness of the activated carbon treatment in reducing PCB bioavailability in benthic organisms as well as the evaluation of potential changes to the benthic community or to the erosion potential of sediments. These evaluations will be performed in 2007 and 2008 (and potentially extending to 2009) as part of the long-term monitoring program.

The following sections summarize the findings from the ACPS following the completion of field implementation activities, including in-river application of activated carbon and environmental monitoring performed during construction.

4.1 Activated Carbon Application

General findings pertaining to the project objective of applying activated carbon to the existing river sediments can be summarized as follows, based on analytical results available during implementation (e.g., using the three method average delta TOC approach) and confirmatory analytical data available after implementation (using the refined black carbon testing method, BC-C):

- Activated carbon was successfully applied to the sediments in the Grasse River ACPS area in a safe manner without any health and safety incidents to site workers or the community or environmental compliance issues.
- The results of the TOC measurements available during-construction (i.e., weight of evidence approach or "three method average delta" metric) indicate that the overall dose of activated carbon added to the treatment areas achieved or exceeded the target dose of 2.5 percent using both the tiller (with and without mixing) and tine sled devices.
- The achievement of the target activated carbon dose of 2.5 percent was confirmed following implementation using a refined analytical method for assessing the amount of black carbon in the sediments (BC-C method performed at UMBC). The overall average activated carbon dose achieved in surface sediments (top 3 inches) throughout all treatment areas ranged from 3.2 to 5.3 percent for the 5-point composite samples, confirming the conclusion from the weight of evidence approach

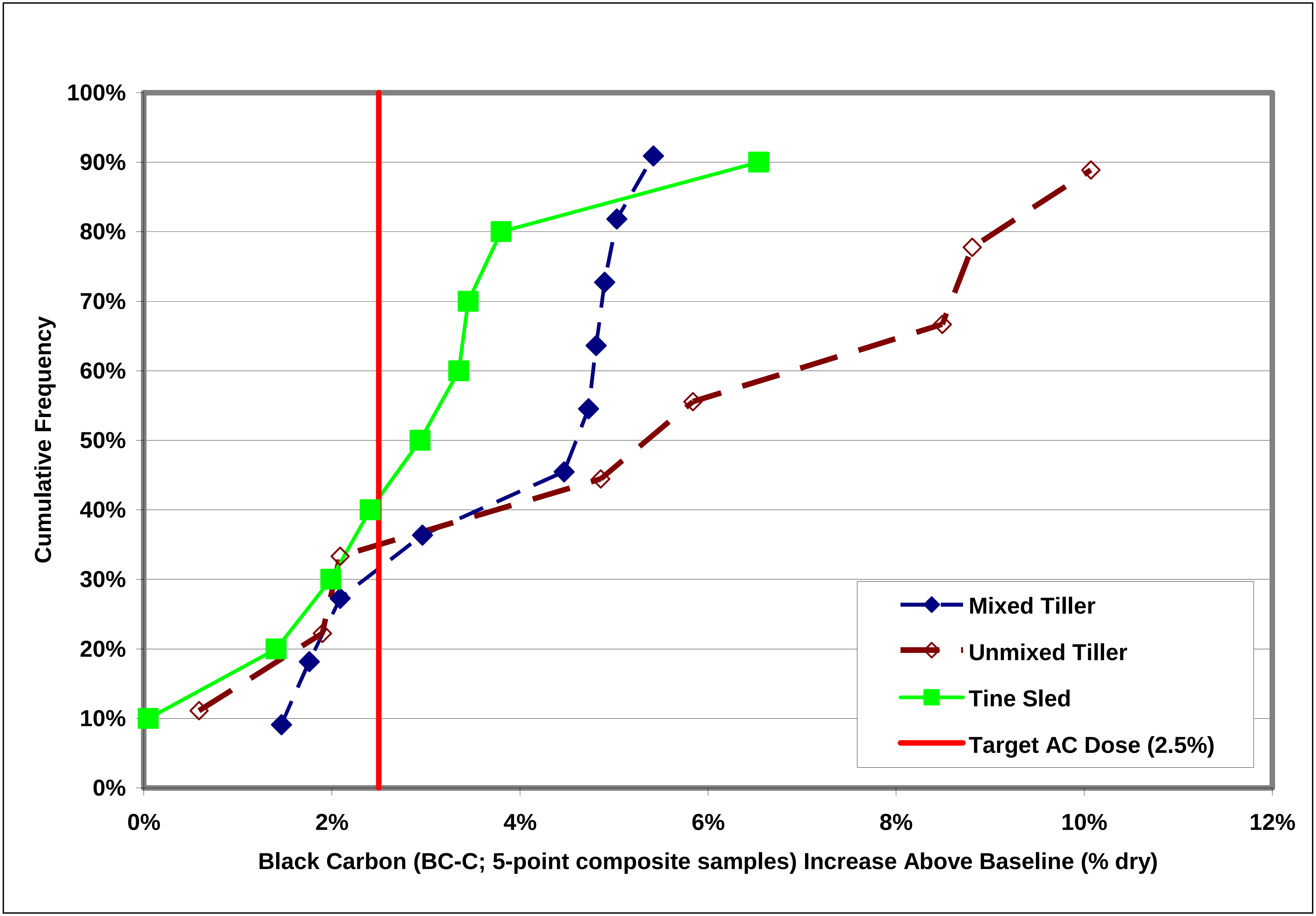
utilized during implementation that the activated carbon application exceeded the target dose of 2.5 percent. BC-C testing of single cores also confirmed that the target activated carbon dose of 2.5 percent was achieved, with the overall average activated carbon dose measured in surface sediments (top 3 inches) throughout all treatment areas ranging from 2.5 to 4.5 percent.

- Overall, more than 65 percent of the ACPS area received an activated carbon dose to surface sediments (top 3 inches) equal to or exceeding the 2.5 percent target, based on confirmatory BC-C testing of 5-point composite samples (see Figure 4-1). Furthermore, an activated carbon dose of 1.3 percent or greater was achieved in approximately 90 percent of the area. As discussed in Section 1.1, in laboratory studies an activated carbon dose of 1.3 percent resulted in an 86 percent reduction in PCB bioaccumulation of tested species.
- The comparison of activated carbon doses measured in 5-point composite samples versus single cores, presented above, indicates that the application and mixing equipment used in this field demonstration resulted in spatial variability of the achieved activated carbon dose. While such variability could likely be reduced through additional design refinements of the application and mixing equipment, the spatial variability resulting from this pilot demonstration will continue to be monitored to evaluate the rate and extent of mixing over time through natural processes (e.g., bioturbation).
- A comparison of the amount of activated carbon applied to that measured after application indicates that a portion of the applied carbon mass remains unaccounted for. On average, approximately 30 to 50 percent of the activated carbon mass applied to the Grasse River surface sediments was recovered in post-application samples using the BC-C technique (see Section 3.3.7 for a discussion of activated carbon recovery relative to achievement of the 2.5 percent target dose). Potential explanations for the apparent lack of closure of the carbon mass balance are discussed in Section 3.3.7. Small-scale spatial variability in the application of activated carbon is likely a significant contributing factor to the observation of unaccounted mass identified through the post-application sampling results. POC measurements taken in both the immediate vicinity of the tiller and during underwater video observations indicated that loss of activated carbon to the water column was not significant (Section 3.4.1.2). To further evaluate the extent that

activated carbon was transported downstream (either during or post-treatment), additional samples will be collected downstream of the ACPS area as part of the 2007 post-ACPS sediment sampling (ECN No. 4).

- Specific observations of the various application methods are as follows:
  - The tiller without mixing successfully applied activated carbon to the sediment surface, as measured in samples from the 0- to 3-inch sediment layer
  - Both the tiller with mixing and tine sled successfully mixed activated carbon into the 0- to 3-inch sediment layer, with some samples also showing slight increases in activated carbon levels in the 3- to 6-inch sediment layer
  - Compared with the tine sled, application of activated carbon using the tiller (with or without mixing) resulted in greater small-scale spatial variability (on the order of 3 to 24 inches) based on evaluation of the TOC measurements
- Activated carbon applied to the Grasse River sediments was observed to be stable on the river bottom under ambient hydrodynamic conditions in the river, including during a pressure wave event caused by the opening of the Snell Lock (see Section 3.4.3).
  - River flows during the ACPS study ranged from approximately 200 to 1,300 cubic feet per second (cfs), which equates to velocities of about 0.03 to 0.2 feet per second (fps) for this portion of the river. Velocities of this magnitude correspond to shear stresses of approximately 0.10 dyne/cm^2 or less, which are too low to result in significant resuspension of river sediments (Alcoa 2001). For comparison, the 100-year storm flow is approximately 15,080 cfs, which corresponds to a current velocity of about 2.2 fps and a shear stress of about 10 dynes/cm^2 for this portion of the river.
  - Pressure waves caused by the release of water from the Snell Lock result in short-term flow reversals in the lower Grasse River. Velocity measurements collected (using acoustic Doppler current profilers) during these flow reversals in 2001 showed a maximum near-bed upstream velocity at T19 of 0.65 fps (Alcoa 2002). This near-bed velocity corresponds to a shear stress of about 1 dyne/cm^2. Due to the larger river cross-section in the vicinity of the ACPS area (relative to that near T19), the near-bed velocities and, thus, shear stresses in the ACPS area during these pressure wave-induced flow reversals are expected to be lower than those experienced at T19.

- The soft nature of the surface sediments within the ACPS study area requires accurate understanding of bathymetry and control of equipment positioning in the vertical plane to achieve application of activated carbon within the desired depth range (top 3 inches).
- The refined methodology for measuring the amount of black carbon applied to the sediment (BC-C method utilizing wet chemical oxidation procedures) provided more reliable and accurate results than the black carbon pre-combustion method (BC-T) or the TOC measurement techniques available during implementation.



ALCOA

Figure 4-1
Frequency Distributions of Delivered Activated Carbon Doses to Grasse River Surface (0 to 3-inch) Sediments

4.2 Interpretation of Environmental Monitoring

The following findings pertain to the project objective of monitoring environmental impacts during the application of activated carbon to the existing sediments.

- No measurable changes in water column PCBs were observed, and project action levels for PCBs were not exceeded, adjacent to or downstream of the ACPS area during activated carbon application.
- Turbidity levels during the performance of the project never approached the action level of 25 NTUs above background. Water quality monitoring performed immediately adjacent to the ACPS area indicated that only a small increase in turbidity occurred during activated carbon application and/or mixing using the tine sled and tiller equipment. Levels measured downstream of the ACPS area were only slightly higher than those measured upstream (average turbidity and TSS increases of roughly 0.2 NTU and 0.8 mg/L, respectively), indicating the application and mixing of activated carbon did not have a significant effect on downstream water quality.
- The water column monitoring data indicate that construction activities did not have a significant impact on water quality in the river, and suggest that the use of silt curtains to contain suspended solids and/or activated carbon is not necessary for future applications of activated carbon using the tine sled or tiller equipment.
- All noise levels measured throughout the course of the construction activities were comparable with baseline monitoring values.

5 LONG-TERM MONITORING PROGRAM

Baseline monitoring has been conducted to establish pre-treatment conditions for comparison to future monitoring results to assess the achievement of the project objectives. Post-treatment long-term monitoring will be performed in 2007 and 2008, approximately 1 and 2 years, respectively, after activated carbon application, to assess the following:

- The effectiveness of the application/mixing process
- The erosion potential of the treated sediments
- Recolonization of the ACPS area by benthic organisms
- Reduction in PCB bioaccumulation in benthic macroinvertebrates

Sediment cores to be used in the laboratory aqueous equilibrium and PCB uptake experiments will also be collected during these surveys. The proposed monitoring schedule is as follows:

- Approximately 1 year following application (August to September 2007): post-treatment monitoring
- Approximately 2 yeas following application (August to September 2008): post-treatment monitoring
- The decision to conduct a third post-treatment survey will be based on the results of the first two post-treatment surveys

Based on the results from the Initial Testing Area, both the tiller and tine sled units were carried forward for testing in the larger-scale pilot application, as described in ECN No. 1 (see Appendix F). This necessitated a change in the study design footprint presented in the original Work Plan (Alcoa 2006b), as discussed in Section 3.1.3. Specifically, the Unmixed Treatment Area, which originally measured 50 feet by 100 feet, was divided into two sub-areas. The upstream sub-area, measuring 50 feet by 60 feet, was designated for "mixed" application using the tine sled. The downstream sub-area, measuring 50 feet by 40 feet, remained as an Unmixed Treatment Area (using the tiller device without engaging the tiller). To further evaluate the likelihood that carbon was transported downstream (either during or post-application), additional samples will be collected downstream of the ACPS area as part of 2007 post-ACPS monitoring (ECN No. 4).

In order to facilitate evaluation of these treatment areas as part of the long-term monitoring program, sediment samples were collected from three locations within each of the Tine Sled

Mixed Treatment Area and the Unmixed Tiller Treatment Area (see Figure 5-1) prior to activated carbon application. These samples were submitted for baseline ex situ biological analysis at UMBC, consistent with the analysis program for the six baseline monitoring locations originally planned within the Mixed Tiller Treatment Area. However, given the timing of the field implementation, it was not feasible to conduct baseline in situ biological studies at the monitoring locations within the Tine Sled and Unmixed Tiller Treatment Areas.

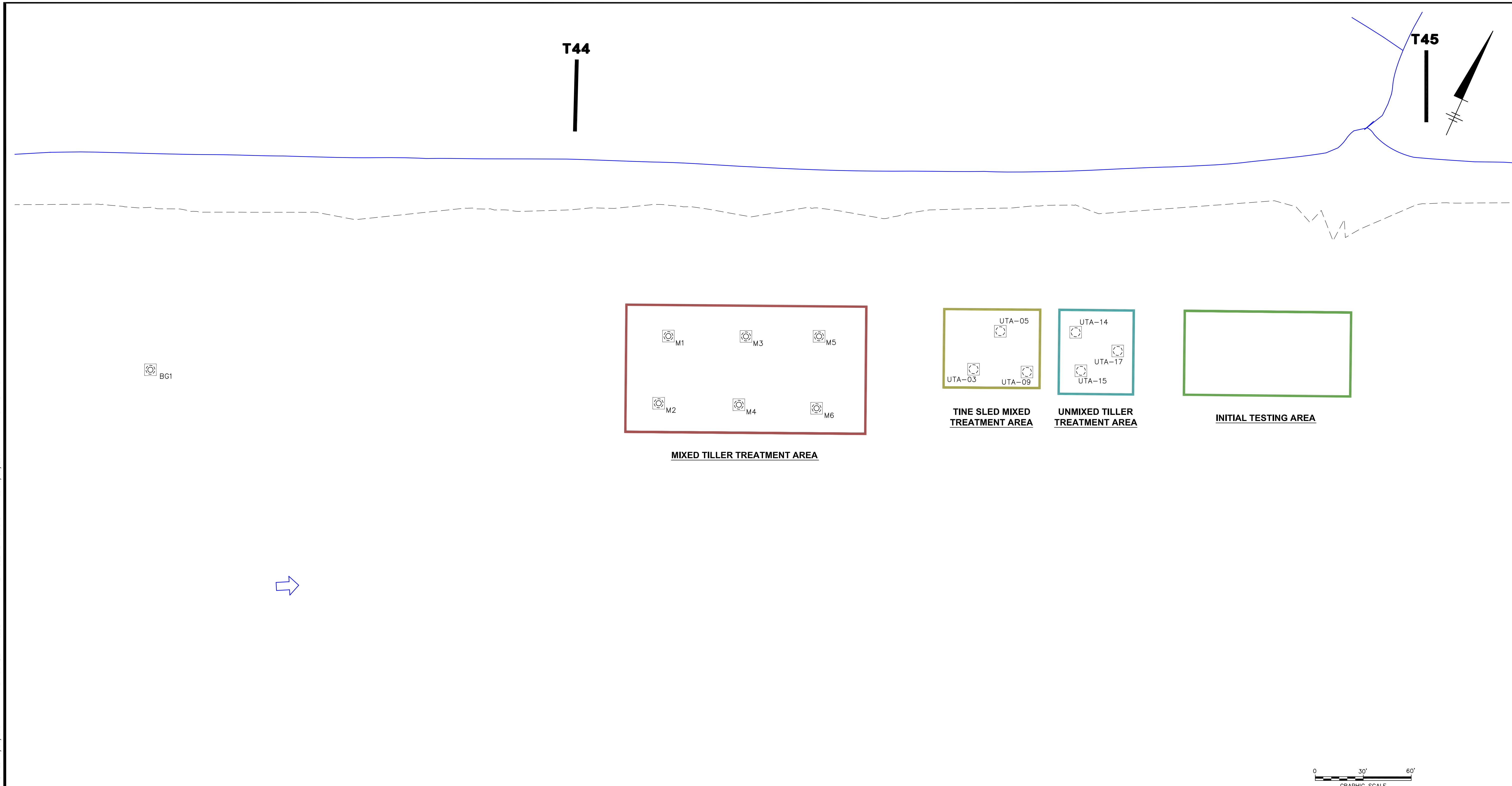
Accordingly, the existing monitoring program will be similarly augmented for the long-term monitoring to include the six additional sampling locations for ex situ biological testing and benthic community studies to provide further information on the relative performance of the different application methods. In addition, a modification to the plan for sediment sampling and activated carbon testing is proposed that incorporates the use of a refined analytical testing method on 5-point composite samples in each of the three treatment areas (see Figure 5-2). The enhanced monitoring scope incorporating the original Unmixed Treatment Area, as defined in the Work Plan (Alcoa 2006b) is provided in Table 5-1, consistent with ECN Nos. 4 and 5 (see Appendix F).

As described in ECN No. 4, the intent of the post-monitoring erosion potential program is to compare the erosional behavior of the bulk surface sediments pre- and post-carbon treatment to qualitatively look for evidence indicating that activated carbon is preferentially resuspended or enhances the resuspension of the bulk surface sediments. Distinctions between sediments treated with the bituminous coal-based and coconut shell-based carbon will not be made given the two carbon types were applied to the river sediments using different application techniques. That is, the bituminous coal-based carbon was applied within the Initial Testing Area and the Mixed Tiller Treatment Area, while the coconut shell-based carbon was applied within the Unmixed Tiller and Tine Sled Mixed Treatment Areas. The post-ACPS erosion potential testing will include the collection and testing of sediments treated with both carbon sources; however, the results of this testing will only be used to identify potential differences in erosion potential between treatment areas. The data will not be sufficient to attribute any potential differences to a specific factor (e.g., carbon type or application method).

5.1 Measurement of Activated Carbon in Sediments During Long-Term Monitoring

As discussed in detail in Appendix A, several laboratory investigations, including matrix spikes and inter-laboratory comparisons, were performed to investigate analytical issues identified with BC-T method. Subsequent to completion of the 2006 field implementation activities, UMBC refined and improved a black carbon-chemical pre-oxidation (BC-C) method (see Section 3.3.2 and Attachment A-3 of Appendix A), resulting in a more accurate and precise procedure to measure activated carbon concentrations in Grasse River sediments, relative to TOC and BC-T methods utilized during 2006 field implementation. Based on the increased accuracy and precision of the BC-C methodology, this technique will be used to perform activated carbon measurements on all future sediment samples collected as part of the ACPS long-term monitoring program. TOC and BC-T analyses are not anticipated during subsequent monitoring events.

In order to allow a direct comparison to 2006 sampling results, future long-term monitoring events will include the collection of 5-point composite samples for BC-C analyses.



LEGEND:

- T45 — 1992 SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- BENTHIC INVERTEBRATE COMMUNITY SAMPLING LOCATION
- M1 — IN-SITU BIOLOGICAL SAMPLING LOCATIONS
- UTA-17 — EX-SITU BIOLOGICAL BULK SEDIMENT SAMPLING LOCATIONS
- FLOW DIRECTION
- TARGET INITIAL TESTING AREA
- TARGET MIXED TILLER TREATMENT AREA
- TARGET UNMIXED TILLER TREATMENT AREA
- TARGET TINE SLED MIXED TREATMENT AREA

NOTE:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

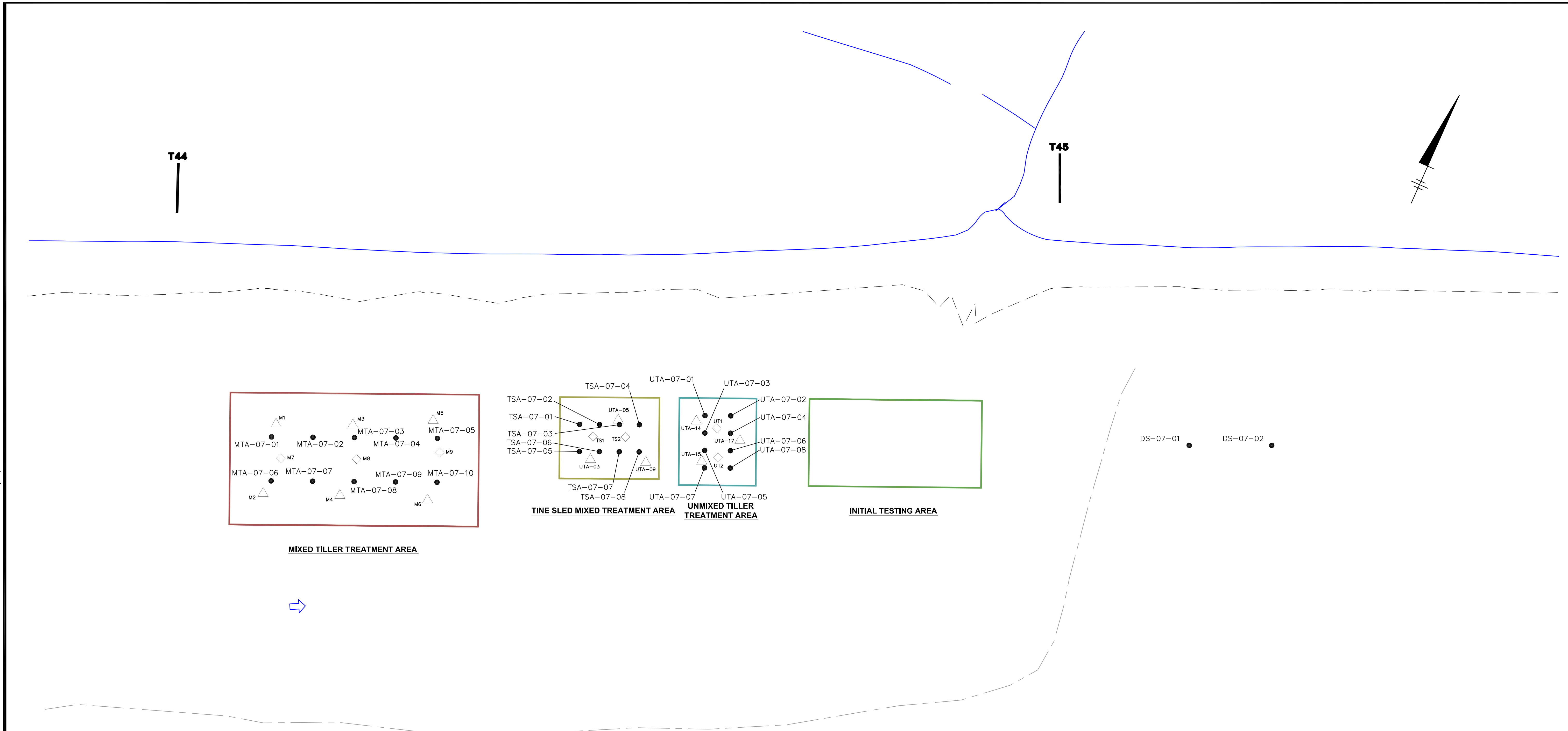
GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY CONSTRUCTION DOCUMENTATION REPORT

LONG-TERM MONITORING BENTHIC INVERTEBRATE COMMUNITY AND BIOLOGICAL SAMPLING LOCATIONS

ALCOA

FIGURE **5-1**



LEGEND:

- T45 — 1992 SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- UTA-03 — SEDIMENT CORE COLLECTION LOCATION (BLACK CARBON [BC-C], MICROSCOPY, AND PCB ANALYSIS; SEE NOTE 2)
- MTA-09 — FIVE-POINT COMPOSITE SEDIMENT CORE COLLECTION LOCATION (BULK DENSITY, PERCENT MOISTURE, AND BLACK CARBON [BC-C] ANALYSIS; SEE NOTE 3)
- M7 — EROSION POTENTIAL TESTING LOCATION
- FLOW DIRECTION
- SILT CURTAIN LOCATION
- TARGET INITIAL TESTING AREA
- TARGET MIXED TILLER TREATMENT AREA
- TARGET UNMIXED TILLER TREATMENT AREA
- TARGET TINE SLED MIXED TREATMENT AREA

NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
2. SEDIMENT CORES WILL BE SEGMENTED 0-1.5 INCHES, 1.5-3 INCHES, 3-4.5 INCHES, 4.5-6 INCHES, 6-9 INCHES, AND 9-12 INCHES AND SUBMITTED FOR ANALYSIS.
3. FIVE-POINT COMPOSITE SEDIMENT CORES WILL BE SEGMENTED 0-3 INCHES, 3-6 INCHES, AND 6-12 INCHES AND SUBMITTED FOR ANALYSIS AS DESCRIBED IN ENGINEERING CHANGE NOTICE NO. 5.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
ACTIVATED CARBON PILOT STUDY

SEDIMENT SAMPLING LOCATIONS LONG-TERM MONITORING

ALCOA

FIGURE
5-2

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PROJECTNAME: ----
XREFS: 10811X00 10811X01 IMAGES: 10811X01.TIF

Table 5-1
Expansion of Monitoring Scope to Incorporate the Additional Testing in the Original Unmixed Treatment Area

Monitoring Method	Original Long-Term Monitoring Scope	Enhanced Long-Term Monitoring Scope
Ex situ PCB biouptake	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope plus 3 additional samples in the Tine Sled Mixed Treatment Area and 3 additional samples in the Unmixed Tiller Treatment Area.
In situ PCB biouptake	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope (additional samples in the Tine Sled Mixed and Unmixed Tiller Treatment Areas not included since in situ baseline studies were not conducted in this area).
PCB aqueous equilibrium	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope plus 3 additional samples in the Tine Sled Mixed Treatment Area and 3 additional samples in the Unmixed Tiller Treatment Area.
PCB desorption kinetics	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope plus 3 additional samples in the Tine Sled Mixed Treatment Area and 3 additional samples in the Unmixed Tiller Treatment Area.
Sediment TOC/black carbon	6 core sections from each of 9 locations for baseline study (TOC and BC-T methods)	Original locations plus additional ten 5-point composite samples from the Mixed Tiller Treatment Area. Three discrete samples plus eight 5-point composite samples from each of the Tine Sled and Unmixed Tiller Treatment Areas. All samples to be analyzed for BC-C. [Note: Three samples in the original Unmixed Tiller Treatment Area reconfigured based on refined treatment area boundaries (see ECN No. 1).] Two additional 5-point composite samples will be collected downstream of the Unmixed Tiller Treatment Area.
Sediment PCB	6 core sections from each of 9 locations for baseline study	Original scope in Mixed Tiller Treatment Area. [Note: Three samples in the original Unmixed Tiller Treatment Area reconfigured based on refined treated area boundaries (see ECN No. 1).] Three additional samples in the Tine Sled Mixed Treatment Area.
Microscopic examination	6 core sections from each of 9 locations for baseline study	Original scope plus 3 locations each from the Tine Sled and Unmixed Tiller Treatment areas (i.e., same locations as "Sediment PCB" listed above.)
Benthic Invertebrate Community Studies	6 locations in Mixed (Tiller) Treatment Area, 3 locations in the Unmixed Treatment Area, and 1 background location	Original scope plus 1 additional sample in the Tine Sled Mixed Treatment Area and 2 additional samples in the Unmixed Tiller Treatment Area. Therefore, a total of 6 samples will be collected from the Mixed Tiller Treatment Area, 3 samples from the Tine Sled Mixed Treatment Area, and 3 samples from the Unmixed Tiller Treatment Area.
Erosion Potential Testing	5 locations sampled during baseline monitoring (3 Mixed Tiller Treatment Area, 2 Tine Sled Mixed Treatment Area)	Original scope in the Mixed Tiller Treatment Area plus 2 locations in the Tine Sled Mixed Treatment Area (reconfigured based on treated area configuration), and the addition of 2 locations in the Unmixed Tiller Treatment Area.

6 REFERENCES

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APPENDIX A

ENVIRONMENTAL MONITORING PROGRAM AND DATA

(Attachment A-2 Data Tables on included CD)

Table of Contents

Tables

Figures

Attachments

1. Overview of Environmental Monitoring Program

An environmental monitoring program was developed in association with the Grasse River Activated Carbon Pilot Study (ACPS) to evaluate achievement of the pilot study objectives outlined in Section 1.2 of the main body of this ACPS Construction Documentation Report. The ACPS environmental monitoring program included baseline, during-application, and post-application events. Baseline monitoring was conducted from July through September 2006; during-application monitoring activities were conducted from September to October 2006; and post-application monitoring events will be conducted in 2007 and 2008 with the potential for additional monitoring in 2009, depending on the results of the first two post-application monitoring events. Each monitoring program event (i.e., baseline, during-application, and post-application) consisted of a number of field and laboratory activities, including:

- Baseline – erosion potential testing, benthic invertebrate community studies, qualitative aquatic habitat survey, sediment sampling (physical and chemical characterization), and field and laboratory biological studies;
- During-application – water column monitoring, noise monitoring, and sediment sampling; and
- Post-application – benthic invertebrate community studies, qualitative aquatic habitat survey, sediment sampling (physical and chemical characterization), and field and laboratory biological studies.

Monitoring activities were performed as outlined in the *In-Situ PCB Bioavailability Reduction in Grasse River Sediments – Final Work Plan* (Work Plan; Alcoa Inc. [Alcoa], August 2006), as amended by Engineering Change Notice (ECN) No. 1 (see Appendix F).

Details regarding the environmental monitoring conducted during the pilot study are presented in Section 2. A summary of the number of samples collected/analyzed during each monitoring event is presented in Table A-1. Attachment A-1 presents a discussion of the quality assurance/quality control (QA/QC) sample results and evaluation, while all environmental data are provided in Attachment A-2.

2. Environmental Monitoring Activities and Results

2.1 Baseline Monitoring

Baseline monitoring was conducted from July through September 2006, prior to implementation of the ACPS to obtain data to establish pre-activated carbon application conditions against which during-and post-application monitoring results will be compared to evaluate achievement of the pilot study objectives. Activities conducted as part of each baseline monitoring component (as listed in Section 1) and a summary of monitoring results obtained are presented in Sections 2.1.1 through 2.1.6.

2.1.1 Erosion Potential Testing

2.1.1.1 Monitoring Activities

The erosion properties of the native bulk surface sediments in the ACPS area were evaluated through erosion potential testing with a sediment shaker apparatus (Tsai and Lick, 1986). This test protocol was deemed appropriate for this study since the shear stresses expected in the vicinity of the pilot test area during a 100-year flood flow (10 dynes per square centimeter [dynes/cm^2]; Alcoa, April 2001) are consistent with the upper end of the range of shear stresses tested by the shaker apparatus. This testing involved the collection of 10 sediment cores, subjecting each core to shear forces in a shaker apparatus, and assessing the resultant erosion.

The baseline erosion potential testing was conducted during the week of July 31, 2006. The study consisted of the collection of two sediment cores from each of five locations, for a total of 10 cores (Figure A-1); two cores were collected from each location to recognize the spatial variability that often exists in river sediments, even in closely spaced cores. Six cores were collected from the Mixed Tiller Treatment Area, two cores were collected from the Tine Sled Mixed Treatment Area, and two cores were collected in the buffer zone between the Tine Sled Mixed and Unmixed Tiller Treatment Areas. Due to their spatial proximity to the Tine Sled Mixed Treatment Area boundary, the two cores collected from the buffer zone were grouped with the two cores collected from inside the Tine Sled Mixed Treatment Area for this evaluation. Two cores were collected at each location using a manual push core sampler that typically retrieved between 6 and 12 inches of sediment. Upon retrieval, the cores were visually inspected to ensure a relatively even sediment surface within the core.

After visual observation was complete, each core was placed in the shaker apparatus -- a device that simulates bottom shear forces at the sediment-water interface by creating turbulence within the water column directly overlying the core (Tsai and Lick, 1986) -- and subjected to shear stresses of 3, 5, and 9 dynes/cm^2 for 10-minute test periods. After each test period, a sample was collected from the overlying water column and submitted to the Alcoa Massena ChemLab (ChemLab) for total suspended solids (TSS) analysis. Four TSS samples were collected per core (one prior to testing and one after the application of each of the 3 different shear stresses). A total of 40 samples were submitted to ChemLab for TSS analyses. QA/QC samples were to include one blind duplicate sample; however, this sample was spilled during transport to the ChemLab and, therefore, not analyzed for TSS.

2.1.1.2 Summary of Results

Data collected during the study were used to establish a baseline for the erosive properties of the native sediments in the ACPS work area. Comparisons among work areas were performed to evaluate potential differences in erosive properties between treatment areas. These data were also compared to the erosive properties of native sediments reported for reach of the river during previous erosion potential testing surveys.

2.1.1.2.1 Estimation of Resuspension Potential

The mass of sediment resuspended when a constant shear stress is applied for a duration sufficient to achieve maximum resuspension is termed resuspension potential (in units of milligrams per square centimeter [mg/cm^2]), ε, and can be calculated using the following relationship:

$$\varepsilon = 0.00254 h \Delta C$$

where:

h = water depth in the sediment core (inches) being tested; and
ΔC = the change in TSS concentration (milligrams per liter [mg/L]) in the overlying water column over the duration of the test.

Resuspension potential was computed for each core using the test-specific water depth (generally 3 inches) and TSS results. The resuspension potential values for each core are presented as a function of shear stress in Figure A-2.

Work Area Comparisons

Erosion properties of the individual sediment cores varied across locations, but followed the expected pattern of increased resuspension potential with increasing bottom shear stress (Figure A-2). The variability observed in these cores is not inconsistent with the variability observed during prior sediment shaker studies in the river (Alcoa, April 2001). Overall, sediment from the Tine Sled Mixed Treatment Area exhibited a higher average resuspension potential at all shear stresses (i.e., 3, 5, and 9 dynes/cm^2) relative to sediments from the Mixed Tiller Treatment Area; however, the overlapping error bars (representing 95% confidence limits) indicate these differences are not statistically significant (Figure A-3). Mean resuspension potentials between treatment areas differed by less than a factor of two at all shear stress levels.

Comparison to Previous Studies

The resuspension potential data for the ACPS samples were compared to those collected from this reach of river during erosion potential testing conducted in 1998 and 2000 (Figure A-4). Due to their spatial proximity to the ACPS work areas, four historic cores (two each from sediment probing Transects [T]42 and T46) were included in this comparison. The range of resuspension potential values determined for these four historic cores are presented as the shaded region in Figure A-4, while the average resuspension potential values from the 2006 ACPS data are presented as symbols. The erosion properties measured within the ACPS area during 2006 are within the range of historic data at all shear stress levels (Figure A-4). The similarity between the 1998/2000 and 2006 resuspension potential testing data suggests that no significant change in erosion properties has likely occurred in the sediments in this reach of the river over time.

2.1.2 Benthic Invertebrate Community Studies

2.1.2.1 Monitoring Activities

Prior to in-river application of activated carbon, sampling activities using a petite ponar grab sampler were conducted in accordance with the *Quality Assurance Work Plan for Biological Stream Monitoring in New York State* (New York State Department of Environmental Conservation [NYSDEC], June 2002). Benthic data assessments followed the multi-metric framework outlined in *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (RBPs; United States Environmental Protection Agency [USEPA], July 1999).

At each of ten sampling locations (Figure A-5), total water depth was measured and one petite ponar grab sample was collected for benthic analysis. A total of six samples were collected from the Mixed Tiller Treatment Area (M1 through M6), three samples total were collected from the Tine Sled Mixed and Unmixed Tiller Treatment Areas (U1 through U3), and one sample was collected from an upstream background location (BG1; Figure A-5). The background location was selected approximately 300 feet upstream of the pilot study in an area with fine-grained sediments and benthic habitat comparable to that observed in the pilot study area. Upon collection, the grab samples were sieved using a U.S. standard No. 30 (0.6 millimeter [mm]) sieve to remove fine sediments, and then preserved in 91% isopropyl alcohol. In total, ten benthic samples were submitted to GEI Consultants Inc./Chadwick Ecological Division (Chadwick) for identification of organisms to the lowest practical taxonomic level and determination of biomass.

Prior to construction, samples were collected from three benthic sampling locations (U1, U2, and U3) in the area defined in the Work Plan (Alcoa, August 2006) as the unmixed treatment area (Figure A-5). However, during construction the original unmixed treatment area was sub-divided into the Tine Sled Mixed and Unmixed Tiller Treatment Areas to accommodate additional evaluation of the tine sled equipment. Based on this revised division of treatment areas, the previously sampled locations U1 and U2 are positioned within the area now defined as Tine Sled Mixed Treatment Area and location U3 is within the Unmixed Tiller Treatment Area. Because of the close proximity of these locations, and the similarity of their benthic habitats (grain size and total organic carbon [TOC]), the benthic results from these three locations will be used as the baseline dataset for comparisons to post-activated carbon application data for both the Tine Sled Mixed and Unmixed Tiller Treatment Areas. It is planned that three benthic samples each will be collected from the Tine Sled Mixed and Unmixed Tiller Treatment Areas during the post-application monitoring events to aid in data comparisons (see Section 5 of the main body of this report).

In addition to benthic sampling, up to four additional sediment grabs were collected concurrently at each sample location using a petite ponar grab sampler. These sediments were processed as a single homogenate at each location and were used in the in-situ polychlorinated biphenyl (PCB) biouptake studies (Section 2.1.4.1) for locations M1 through M6 and BG1 (7 locations), with the remaining portion from each of the ten locations (M1 through M6, U1 through U3, and BG1; Figure A-5) containerized and submitted to various analytical laboratories for testing. In total, ten sediment samples were submitted to the University of Maryland, Baltimore County (UMBC) for ex-situ PCB uptake studies and PCB congener analysis, to Northeast Analytical Inc. (NEA) for PCB Aroclor (to compare with UMBC's PCB congener analytical results) and TOC analysis, and to CDM Soils Laboratory for grain size analysis. One field duplicate sample was collected and submitted for each of the PCB, TOC, and grain size tests. Details on the QA/QC analyses and results are presented in Attachment A-1.

The results of the benthic sampling, and grain size and TOC analyses, in the context of benthic habitat, are presented in Section 2.1.2.2.

2.1.2.2 Summary of Results

The baseline benthic data were tabulated (Table A-2) and metrics were calculated (Tables A-3 and A-4) following USEPA RBPs (USEPA, July 1999). As recommended by USEPA, the metrics chosen for this analysis included measures of benthic abundance, diversity, tolerance, and life history adaptations. The seven site-specific metrics utilized in this macroinvertebrate community characterization are: 1) total organisms; 2) biomass; 3) number of taxa; 4) diversity index; 5) tolerance index; 6) feeding guild; and 7) organism habit. The seven metrics and associated values from each of the three sample areas are discussed below. The metrics are listed below with a brief explanation regarding interpretation.

1. Total Organisms: Count of all individuals in the sample. Used as the denominator for several other metrics, and also useful for assessing differences in the number of organisms between different samples.
2. Biomass: Measure of wet-weight sample mass. Useful for comparing sample differences in biomass and understanding the trophic food base.
3. Number of Taxa: Total number of distinct taxa per sample. Measures the overall variety of the species assemblage.
4. Diversity Index: Measures the diversity of the sample in terms of number of taxa and relative species abundance. Scores for this index typically range from 0 to 5 with larger numbers indicating greater diversity.
5. Tolerance Index: Calculated measure of organism tolerance or sensitivity to perturbation based on abundance and tolerance values ascribed originally by Hilsenhoff (1987). Can also be used to evaluate organic pollution. Scores for this index range from 0 to 10 with larger numbers indicating greater tolerance to perturbation.
6. Feeding Guild: Functional feeding group measure that identifies feeding strategies based on food type and availability. Feeding groups can become skewed and unbalanced based on changes to environmental conditions (USEPA, July 1999).
7. Organism Habit: Mode of existence based on differing adaptations for movement and maintaining position. Similar to feeding guild in that this metric can become skewed and unbalanced based on changes to environmental condition (USEPA, July 1999).

Results of the benthic analysis show a community that is typical of one that would inhabit fine-grained sediments (Tables A-3 and A-4). Of the nine benthic orders represented, 80% of the overall taxa came from the orders Diptera (midge larva) and Oligochaeta (aquatic worms) (46% and 34%, respectively), with 65% of the overall taxa being burrowers (i.e., organisms that burrow in sediments). Dipterans and oligochaetes are often the dominant taxa in fine-grained sediments (i.e., sands and silts) because they are adapted to live in this type of environment (Merritt and Cummins, 1996; Thorp and Covich, 2001). The other orders represented are 8% Pelecypoda (bivalves), 4% Coleoptera (beetles), 2% Ephemeroptera (mayflies), 2% Isopoda (sowbugs), 2% Gastropoda (snails), 1% Trichoptera (caddisflies), and1% Amphipoda (scuds). As shown in Table A-3, the mean representation of these orders is similar among the Mixed Tiller Treatment Area (M1 through M6), the Tine Sled Mixed and Unmixed Tiller Treatment Areas (U1 through U3), and upstream background location (BG1; Figure A-5).

Benthic metric results reflect a community typical of fine-grained sediments (e.g., moderate benthic diversity and abundance, moderate tolerance, high percentage of gatherers and burrowers, low percentage of filterers, clingers, and climbers, etc.) and were comparable between the three areas; the Mixed Tiller Treatment Area (M1 through M6), Tine Sled Mixed and Unmixed Tiller Treatment Areas (U1 through U3), and the upstream background location (Table A-4). For example, the mean number of distinct taxa per sample in the three areas was 10, 9, and 11, respectively. The mean number of organisms was 19 in the Mixed Tiller Treatment Area, 12 in the Tine Sled Mixed and Unmixed Tiller Treatment Areas, and 18 in the upstream background location. Mean wet-weight biomass was comparable in the three areas at 57, 31, and 28 milligrams (mg) per sample, respectively. The diversity index, as well as tolerance index, was similar between areas, with diversity scores being 2.9, 3.1, and 3.4, respectively, and tolerance scores being 8.5, 8.0, and 8.2, respectively. The dominant feeding groups present in the samples were gatherers and predators, representing 57% and 32% of the organisms in the Mixed Tiller Treatment Area, 49% and 39% of the guilds in the Tine Sled Mixed and Unmixed Tiller Treatment Areas, and 44% and 39% of the organisms in the upstream background location, respectively. As previously mentioned, the dominant organism habit in each of the three areas was burrowing (66%, 66%, and 61%, respectively).

Grain size results were comparable between the Mixed Tiller Treatment Area (M1 through M6), the Tine Sled Mixed and Unmixed Tiller Treatment Areas (U1 through U3), and the upstream background location. Average TOC values, which reflect the availability of benthic food, were also comparable between areas at 4.9% and 4.5% for the Mixed Tiller Treatment Area and Tine Sled Mixed and Unmixed Tiller Treatment Areas, respectively, and 4.0% for the background location (Table A-5).

These results will be compared to the post-treatment benthic data to evaluate potential changes in the benthic community due to the application of activated carbon in Grasse River sediments, as well as to determine potential year-to-year or seasonal temporal changes in the benthic community (as would be reflected in the upstream background location results).

2.1.3 Qualitative Aquatic Habitat Survey

2.1.3.1 Monitoring Activities

A qualitative baseline aquatic habitat survey was performed in the pilot study area on August 24, 2006 to determine the general benthic habitat conditions and substrate features of the area, as well as to evaluate the presence of submerged, rooted aquatic vegetation. The aquatic habitat survey was conducted primarily by visual observation using a boat and underwater video camera. Baseline habitat conditions in the project area were characterized along evenly spaced transects running the length of each application area (parallel to the shoreline), with three transects established in the Mixed Tiller Treatment Area and two transects in the Tine Sled Mixed and Unmixed Tiller Treatment Areas (Figure A-5). A video monitor was used onboard the boat to examine the aquatic habitats in real time as each transect was traveled, and a digital video disk (DVD) recording was made of each transect pass for further examination as necessary.

In addition to visual observations, water quality measurements were taken from each treatment area and the background location as part of the benthic invertebrate community sampling to supplement the qualitative aquatic habitat survey. Water quality measurements were taken at locations M1, U1, and BG1 (Figure A-5) within one foot of the surface and bottom of the water column, as well as in the middle of the water column. Measurements included water flow velocity, temperature, pH, conductivity, turbidity, and dissolved oxygen (DO) measurements. Habitat observations were also supplemented by the grain size and TOC results from samples that were collected during the benthic invertebrate community sampling.

2.1.3.2 Summary of Results

Based on visual observations and inspection of the underwater DVD recording, the baseline substrate in the vicinity of the treatment areas was primarily homogenous, fine-grained sediments (bare sediments) with no apparent vegetation growing on the channel bottom. No other habitat features (such as large woody debris or rocks/boulders) were observed.

The grain size laboratory analysis supports the visual observations, showing a benthic habitat dominated by medium to fine sands and silts with some coarse sand and a little fine gravel and clay (Table A-5). For all locations, water quality parameters were consistent with previous water quality data collected from the Grasse River (Table A-6).

2.1.4 Field and Laboratory Biological Studies

2.1.4.1 In-Situ PCB Biouptake Studies

2.1.4.1.1 Monitoring Activities

As described in the ACPS Work Plan (Alcoa, August 2006), the freshwater oligochaete *Lumbriculus variegatus* was selected as a bioaccumulation test organism for assessing the change in bioavailability of PCBs to benthic organisms after amending sediments with activated carbon. This organism was selected for bioaccumulation tests based on the USEPA method for testing bioaccumulation in freshwater sediments (USEPA, March 2000), as well as previous studies by Burton et al. (2005) and Sibley et al. (1999), which demonstrated the use of this organism for in-situ bioaccumulation measurements in freshwater sediments.

Baseline in-situ bioaccumulation tests were carried out in August/September 2006 (August 23 to 25, 2006 baseline deployment and September 6 to 8, 2006 baseline retrieval). *L. variegatus* were deployed in screened cages (i.e., bioassay exposure chambers) at six sampling locations (M1 to M6) and at one reference location for an exposure period of 14 days (Figure A-5), following the American Society for Testing and Materials (ASTM) method described in the *Draft Standard Guide for Assessing Freshwater Ecosystem Impairment Using Caged Fish or Invertebrates* (Burton, 2002). In support of this in-situ approach, a trial field deployment was performed in July 2006 (prior to the baseline studies) to evaluate the logistics associated with deploying and retrieving the caged worms in the river and the survival of the worms in field conditions. Based on the results from the trial deployment and with feedback from the USEPA, the wet tissue mass in each exposure chamber was increased to 0.5 grams.

The in-situ deployment followed the "surficial sediment and pore water exposure" method outlined in Burton (2002). This in-situ testing method is designed to achieve organism exposure to surficial sediment and sediment pore water at the site. In-situ exposure chamber design followed Burton (2002). The chambers were constructed of cellulose acetate butyrate tubes 12.7 centimeters (cm) in length and 7 cm outside diameter in which two 4x8 cm openings were constructed and covered with a nylon mesh. The *L. variegatus* were obtained from Aquatic Research Organisms, Hampton, New Hampshire. The required quantity of worms for each exposure chamber were separated out in labeled 20 milliliter (ml) glass vials with 10 ml Grasse River water and transported to the site in a cooler.

At each sampling location, six replicate chambers were deployed mounted together on a rack for ease of retrieval. One set of test chambers was also deployed at the reference location. To initiate the caged exposure, surficial sediment was collected from the location and split for use in the in-situ and ex-situ bioaccumulation tests (Section 2.1.4.2). Sediment was placed in each chamber, filled with site water, and allowed to equilibrate and settle for 15 minutes before introduction of the worms through a small port in the chamber. Due to the water depth in the pilot study area, the worms were not flushed down an inlet tube as suggested in the ASTM draft method. Rather, the cage baskets were tied with a nylon rope to a foam buoy that was placed 3 feet under water to reduce visibility. A decoy buoy placed nearby marked the position of the test location (Figure A-6). An underwater video camera was used to monitor the placement of the cages upright on the sediment surface as shown in Figure A-6. The bioassay chambers remained in the river for 14 days. After the exposure duration, the cages were located and retrieved, and the worms separated from the sediment. The worms were placed in depuration chambers (for a 6-hour depuration period) before being frozen and shipped to the UMBC laboratory for PCB extraction and analysis.

2.1.4.1.2 Summary of Results

The average recovery of tissue weight from the exposure chambers ranged from 75 to 102%, with an overall average recovery of 87% for all deployments. The average tissue weight recoveries as well as the range of tissue weight recoveries at each sample location is shown in Table A-7a. The details of the in-situ bioaccumulation test method are described in the standard operating procedure (SOP) method outlined in the Work Plan (Alcoa, August 2006) for in-situ studies. Congener level PCB analysis is currently being conducted on worms retrieved from each exposure chamber separately. The results of these analyses will be presented in a separate report.

2.1.4.2 Ex-Situ PCB Biouptake Studies

2.1.4.2.1 Monitoring Activities

Ex-situ (laboratory) biouptake studies were conducted in parallel with the in-situ biouptake studies described in Section 2.1.4.1. The laboratory test method was based on the USEPA *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates* (USEPA, March 2000). Bioaccumulation tests were conducted for the baseline study from sampling locations M1 to M6, the background location and at six additional sampling locations in the Unmixed Tiller and Tine Sled Treatment Areas per ECN No. 1 (UTA-03, UTA-05, UTA-09, UTA-4, UTA-15, and UTA-17; Figure A-5). Organisms from the same batch of *L. variegatus* were used in both the in-situ study and the laboratory exposure study. Worms were exposed to the sediments in 400 ml glass beakers for 14 days and maintained at 23 $\pm$ 1 degree Celsius (°C) in a water bath with a 16 hour light: 8 hour dark photoperiod (Figure A-7). At the termination of the experiment, worms were removed from the sediments and allowed to depurate for 6 hours in a clean beaker containing water. The depurated worms were then homogenized with excess sodium sulfate and extracted with a 50:50 mixture of hexane and acetone under sonication. The details of the laboratory bioaccumulation test method are available in the SOP in the Work Plan (Alcoa, August 2006) for laboratory studies.

2.1.4.2.2 Summary of Results

Ex-situ bioaccumulation tests were conducted successfully with adequate recovery of tissue mass for chemical analyses. The average recovery of tissue weight from the exposure beakers in the Mixed Tiller Treatment Area ranged from 58 to 87%, with an overall average recovery of 69% for all deployments. The recovery of tissue weight from the exposure beakers in the Unmixed Tiller Treatment Area ranged from 105 to 149%, with an overall average recovery of 120% for all deployments. All average tissue weight recoveries as well as the range of tissue weight recoveries at each sample location are shown in Table A-7b. PCB analyses are currently being completed, and the results of these analyses will be presented in a separate report.

2.1.5 Sediment Sampling

2.1.5.1 Monitoring Activities

Two sediment sampling events were conducted to characterize baseline sediment quality conditions in the project area prior to ACPS construction activities. The first event was conducted on August 8, 2006 and included the collection of six cores from the Mixed Tiller Treatment Area and three cores from the Tine Sled Mixed and Unmixed Tiller Treatment Areas (total of nine sediment cores; Figure A-8) for physical and chemical characterization. Sampling was conducted using manual core collection techniques with cores advanced to refusal. Cores were processed and segmented into 0 to 1.5 inches, 1.5 to 3 inches, 3 to 4.5 inches, 4.5 to 6 inches, 6 to 9 inches, and 9 to 12 inches intervals, resulting in a total of 54 samples. These samples were submitted to the UMBC laboratory for characterization of TOC and PCB (congener) levels, and also for microscopy analysis. Unused portions of each baseline sample were archived and subsequently analyzed for black carbon levels using the black carbon-chemical preoxidation (BC-C) method described in Attachment A-3. In addition, QA/QC samples were collected during core processing and included 3 blind duplicates and 3 matrix spike/matrix spike duplicates (MS/MSD; 1 QA/QC sample per 20 samples). The MS/MSD samples were only submitted for PCB (congener) analysis. Details on the QA/QC analyses and results are presented in Attachment A-1.

The second baseline sediment sampling event included collection of baseline sediment verification cores from September 12-14, 2006 in the Initial Testing, Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas (Figure A-8). The information obtained during this event was used to provide a more robust data set for comparisons between baseline and during/post-activated carbon application conditions. Sampling included collection of 86 cores from the pilot study area with cores collected from each sub-area as indicated below.

	Number of Cores Collected	**Sample Depth Intervals (inches)**
Initial Testing Area		
- Mixed Tiller application cells	16	0 to 3, 3 to 6
- Unmixed Tiller application cells	6	0 to 3
- Tine Sled application cells	16	0 to 3, 3 to 6
- Accepted Method area	16	0 to 3, 3 to 6
Mixed Tiller Treatment Area	16	0 to 3, 3 to 6
Tine Sled Mixed Treatment Area	10	0 to 3
Unmixed Tiller Treatment Area	6	0 to 3

Similar to the August baseline sampling event, cores were collected using manual techniques with each core advanced approximately 6 inches into the sediment. Cores were processed according to the segmentation scheme listed in the table above. A total of 150 samples (plus eight blind duplicate QA/QC samples) were submitted to NEA for TOC, percent moisture, and bulk density analysis. Details on the QA/QC analyses and results are presented in Attachment A-1. Note that it was determined during construction activities in the Initial Testing Area that baseline black carbon data were desired to evaluate the effectiveness of application activities. As a result, preliminary black carbon analyses were run by NEA on the majority of the samples (total of 104 samples) collected during the baseline event using the black carbon-chemothermal precombustion (BC-T) screening method (see Section 2.1.5.2 for additional details).

During both baseline sediment core collection events, each sampling location was identified using real-time kinematic differential global positioning system (RTK-DGPS) techniques. The total water column depth was measured to the nearest 0.1 foot with a survey rod, and the water surface elevation was recorded with RTK-

DGPS. Cores were collected manually using 3-inch-diameter Lexan tubing with a check valve device in accordance with the SOP in Appendix B of the *Post-Remedial Options Pilot Study Monitoring Work Plan* (Alcoa, July 2006). Upon retrieval, each core was split, photographed, and physical characteristics including general soil type (sand, silt, clay, and organic matter/other matter) as determined using the Unified Soil Classification System (USCS) and the approximate grain size category (fine, medium, coarse), were observed and recorded in field books. Samples were handled, packaged, and shipped according to the SOP provided in the *Post-Remedial Options Pilot Study Monitoring Work Plan* (Alcoa, July 2006).

2.1.5.2 Summary of Results

Results of the baseline sediment sampling are discussed below. Comparisons among work areas were performed to evaluate potential differences in sediment characteristics between treatment areas. These data were also compared to the sediment characteristics of native sediments collected from this reach of the river during previous sediment sampling surveys.

Comparison Across ACPS Areas

Sediment samples collected during the September baseline monitoring survey were used to characterize the TOC levels, dry density and moisture content of the native sediments in the ACPS area. Results of this survey are presented in Table A-8. TOC levels in surface (i.e., 0 to 3 inches) sediments were variable, but exhibited no consistent differences across treatment areas (Figure A-9, panel a). Overall, TOC levels in the surface sediments ranged from 2.9% to 8.2%, with average levels of 5.4%, 5.5%, 5.3% and 5.6% for the Initial Testing Area, and Mixed Tiller, Unmixed Tiller, and Tine Sled Mixed Treatment Areas, respectively. Two cores (UTA-11 and UTA-12) were collected from the buffer zone between the Unmixed Tiller and Tine Sled Mixed Treatment Areas; surface TOC results for these samples were 6.0% and 4.5%, respectively. TOC levels in the deeper (3 to 6 inches) samples from the Initial Testing Area and Mixed Tiller Treatment Area were similar to those measured in surface sediments (Figure A-10, panels a and d). An equivalent comparison could not be made for the Unmixed Tiller and Tine Sled Mixed Treatment Areas since only surface samples were collected from these areas. The observed similarities are supported by a comparison of the 95% confidence limits (i.e., +/- two standard errors), which revealed no statistically significant differences in baseline TOC levels between treatment areas and between depths (Figure A-11, panel a). Therefore, combining samples from all areas and both depth intervals yields an average baseline TOC of 5.4% for the native sediments in the ACPS area.

Although some variability was noted, the bulk density and moisture content measurements were relatively similar across the Initial Testing Area and three treatment areas (Table A-9 and Figure A-9, panels b and c). Average bulk densities and percent moisture levels in the surface sediments ranged from 0.38 to 0.41 grams per cubic centimeter (g/cm^3) and 67.0 to 68.7%, respectively (Table A-9). Comparison of the 95% confidence limits (i.e., +/- two standard errors) revealed no statistically differences in surface sediment bulk density or moisture content between treatment areas (Figure A-11, panels b and c). However, the 3- to 6-inch samples exhibited higher bulk density and lower moisture content than those measured in the surface samples (Figure A-10, panels b, c, e and f**)**.

In addition to standard TOC analyses, a subset of samples were also analyzed for black carbon using a BC-T screening method. However, inter-laboratory comparisons of BC-T levels in split samples from the ACPS area indicated that this analytical measurement technique used during field implementation of the project did not provide an accurate measure of black carbon (BC-T) levels in the sediments (see Section 2.2.3.2.1 for additional details). For this reason, the BC-T screening data generated for these baseline samples are not presented in this report.

Subsequent to completion of the 2006 field implementation activities, 36 selected sediment samples collected during the August 2006 baseline sediment survey (and subsequently archived) were analyzed at UMBC using the refined black carbon-chemical preoxidation (BC-C) method (see Attachment A-3). This analytical technique was not fully developed until after construction activities in the river were completed and, thus, these data were not used to make construction-related decisions in the field. The black carbon (BC-C) results are presented in Table A-10. In samples collected from the Mixed Tiller Treatment Area, black carbon (BC-C) in the top 1.5 inches averaged 0.05% and tended to be lower than those measured in the deeper samples (0.09 to 0.12%). An opposite trend was observed in samples collected from the Tine Sled and Unmixed Tiller Treatment Areas; black carbon (BC-C) levels in the top three inches (range of 0.12 to 0.17%) tended to be higher than those observed in the deeper samples (range of 0.07 to 0.08%; Figure A-12, panel a). These differences are also apparent in panel b of Figure A-12, where average black carbon (BC-C) levels in the top three inches of sediments are compared to those in the lower three inches of the sampled sediments. However, given the variability observed in the measurements and the limited number of samples upon which these comparisons are based, there were no statistically significant differences in baseline black carbon (BC-C) levels between treatment areas and between depths. For this reason, all baseline samples were combined and used to define an average baseline black carbon (BC-C) level of 0.10% for the ACPS area.

PCB measurements are currently being performed on the sediment samples collected during the August baseline survey and are not available at the time of this report. A discussion and presentation of these results will be included in a subsequent document.

Comparison to Historic Information

The baseline TOC, bulk density, and moisture content data collected from the ACPS area are compared to data collected from this reach of river during previous sediment surveys (i.e., 1991 to 2004) in Figure A-13. Ten historic cores and nine grab samples (located between T43 and T46) are included in this comparison due to their spatial proximity to the ACPS work area. On average, the surface samples collected during the ACPS baseline monitoring contained somewhat higher TOC levels, lower bulk densities, and higher moisture contents relative to those collected historically from this area. However, the overlap in the 95% confidence limits (i.e., +/- two standard errors) for each of these parameters indicates differences between the ACPS baseline samples and historic samples are not statistically significant.

Black carbon (BC-C) levels in Grasse River sediments have not been measured historically and, thus, a similar comparison could not be made for this parameter.

2.2 During-Application Monitoring

During-application monitoring was performed during in-river ACPS construction activities (i.e., silt curtain installation/removal and activated carbon application) to obtain information on potential impacts to the environment during construction (water column and noise monitoring) and to evaluate effectiveness of application activities (sediment sampling). During-application monitoring activities and a summary of monitoring results obtained are presented in Sections 2.2.1 through 2.2.3.

2.2.1 Water Column Monitoring

2.2.1.1 Monitoring Activities

Water column monitoring was conducted to assess potential water quality effects associated with the silt curtain installation/removal and activated carbon application processes. Water column monitoring was conducted daily at pre-determined locations (routine water column monitoring) and during specified days at targeted locations (supplemental water column monitoring). Routine and supplemental water column monitoring activities are described below.

2.2.1.1.1 Routine Water Column Monitoring

Routine water column monitoring was conducted from September 20 through October 16, 2006 during in-river work activities to assess the potential effects of construction activities on water quality. Monitoring occurred once daily approximately two hours after initiation of in-river work activities at five locations (Figure A-14) including (from upstream to downstream):

- WCT43 – fixed transect location approximately 500 feet upstream of the pilot study area;
- ACPS-1 – fixed local location outside of silt curtain adjacent to pilot study area;
- ACPS-2 – fixed local location outside of silt curtain downstream of pilot study area;
- ACPS-3 – mobile local location within silt curtain adjacent to application activities; and
- WCT46 – fixed transect location approximately 500 feet downstream of the pilot study area.

During silt curtain installation and removal (September 20-22, 2006 and October 14 and 16, 2006), water column monitoring was only performed at WCT43 and WCT46. During activated carbon application activities (September 23 through October 13, 2006), water column monitoring was performed at all locations.

At each transect location (WCT43 and WCT46), water column monitoring was conducted at three equidistant points (north, center, and south) along the transect. At each of these points along the transect, grab samples were collected at three depths (0.2, 0.5, and 0.8 times the total water column depth) for a total of nine grab samples. These nine grab samples were then composited by transect for laboratory analysis. At each local monitoring location (ACPS-1, ACPS-2, and ACPS-3), grab samples were collected from the three depths (0.2, 0.5, and 0.8 times the total water column depth) and then composited by local location for laboratory analysis.

Water quality parameters were also collected at the local locations and the center channel point along each transect. Water temperature and specific conductivity were measured every 2 feet in depth to evaluate the presence of stratification, which was defined based on an evaluation of prior Grasse River monitoring data as a specific conductivity difference of at least 20 microSiemens per centimeter (μS/cm) or water temperature difference of at least 3 °C observed between the 0.8 and the 0.2 times the total water depth. Measurements of specific conductivity, water temperature, turbidity, DO, and pH were also collected at 0.2, 0.5, and 0.8 times the total water depth. At the request of USEPA, turbidity measurements were also recorded at WCT46 at the north point starting September 22, 2006 in order to evaluate if turbidity levels directly downstream from the ACPS area were different from those observed at the center channel point.

Water column depths were recorded at all sampling locations using an acoustic depth finder. Samples were collected using a Kemmerer stainless steel sampler, and water quality measurements were obtained using a YSI water quality meter. All measurements and sampling information were recorded in the field on a Personal Digital Assistant (PDA) which allowed for rapid electronic distribution of the field data.

All samples were submitted to the ChemLab for PCB (Aroclor, unfiltered) and TSS analyses with results requested on a 24-hour turn-around-time (TAT). QA/QC samples included one rinse blank (collected each morning), and one blind duplicate and one MS/MSD per 20 samples. Blind duplicates were analyzed for PCB (Aroclor) and TSS, while rinse blanks and MS/MSD samples were analyzed for PCB (Aroclor) only.

A total of 85 water samples, 20 rinse blanks, 5 blind duplicates, and 10 MS/MSD samples were collected and analyzed during the 20 days of monitoring. Table A-11 provides a summary of the daily water column sampling along with the associated construction activities. Details on the QA/QC analyses and results are presented in Attachment A-1.

2.2.1.1.2 Supplemental Water Column Monitoring

Multiple supplemental water column monitoring events were conducted (in addition to the routine water column monitoring) to evaluate water quality impacts resulting from a specific construction activity. Supplemental water column monitoring included collection of turbidity measurements and water column samples as described below.

Continuous Turbidity Measurements

Turbidity monitoring was conducted during the first day of activated carbon application in the Initial Testing Area (i.e., mixer tiller application cells on September 25, 2006). Prior to application, baseline readings were collected at the upstream boundary of the Initial Testing Area near the north shore to obtain data for comparison with during-application levels. Continuous turbidity readings were then collected once the tiller was lowered through the water column, during mixing activities and settling, and as the tiller was lifted back to the water surface. Turbidity readings were collected immediately upstream (approximately 20 feet) of the first tiller application cell (cell MIX TU1-N1; Figure A-15) at 0.8 times the total water column depth.

Similarly, continuous turbidity readings were collected at 0.8 times the total water column depth during operations in the next two tiller application cells (cells MIX TU1-N2 and MIX TU1-N3; Figure A-15). Turbidity measurements were collected between the tiller and the equipment barge (approximately 3 to 5 feet downstream of the tiller) during work in cell MIX TU1-N2 and just downstream of the equipment barge during work in cell MIX TU1-N3.

Additional turbidity monitoring was also conducted during the first tine sled pull in the Initial Testing Area on September 26, 2006. Continuous turbidity readings were collected downstream of the equipment barge at 0.8 times the total water column depth during tine sled positioning and pull.

The final continuous turbidity monitoring event was conducted on September 29, 2006 during tiller applications where the sediment surface was accurately measured in the field through manual survey techniques (as described in Section 3 of the main body of this ACPS Construction Documentation Report). Readings were collected approximately 10 feet downstream of the tiller (between the tiller setup and equipment barge) at 0.8 times the total water column depth.

Water Column Sampling

Additional water column samples (beyond the routine monitoring) were collected during two events. On October 9, 2006, additional samples were collected at the routine monitoring locations (i.e., WCT43, ACPS-1, ACPS-2, ACPS-3, and WCT46) for particulate organic carbon (POC) analysis. Samples were submitted to NEA for analysis.

Samples were also collected immediately upstream and downstream of the tiller during activated carbon application/mixing and after the tiller was lifted from the sediment bed (i.e., total of four samples) on October 10, 2006. These samples were collected during application within cell MAU1-N7 (Figure A-15). One additional sample was collected from within the vent located on the top of the tiller housing during activated carbon application/mixing in cell MAU1-N8 (Figure A-15). All samples were submitted to the ChemLab for TSS analysis and to NEA for POC analysis.

2.2.1.2 Summary of Results

Water column TSS and turbidity levels measured during the ACPS are presented in Table A-12; daily Water Column Data Summary forms are included in Attachment A-4. Temporal profiles of TSS and turbidity levels measured upstream (WCT43) and downstream (WCT46) of the ACPS area are presented in Figure A-16, while those measured at the local monitoring stations are presented in Figure A-17. Average TSS and turbidity levels by application type are presented in Figure A-18. PCB concentrations are not presented in these figures since they remained below the detection limit (0.065 ppb) at all locations throughout the entire study. Results of the continuous turbidity monitoring are presented in Table A-13, while the supplemental water column POC and TSS results are presented in Table A-14.

Overall, turbidity and TSS levels remained low throughout ACPS construction operations. Water quality monitoring performed immediately adjacent to the ACPS area indicated that small but measurable turbidity increases (typically less than 1 nephelometric turbidity unit [NTU]) occurred during application and/or mixing using the tine sled or tiller equipment (Figure A-17). However, levels measured downstream of the ACPS were only slightly higher than those measured upstream, indicating these releases did not have a significant effect on downstream water quality. No measurable changes in water column PCBs were observed adjacent to or downstream of the ACPS area throughout the study. The water column monitoring data indicate the construction activities did not have a significant impact on water quality in the river, and suggest that the use of silt curtains to contain suspended solids and/or activated carbon is not necessary for the application of activated carbon using the tine sled or tiller equipment.

A more detailed discussion of the water column data collected during activated carbon application in each of the test areas is provided below.

2.2.1.2.1 Initial Testing Area

TSS levels remained relatively low at all locations throughout activated carbon application in the Initial Testing Area. At the upstream monitoring location, TSS levels were non-detect on four of the six days of activated carbon application; detectable TSS measurements of 1.6 mg/L and 2.0 mg/L were recorded on September 27 and 29, 2006, respectively (Figure A-16). Overall, TSS levels upstream of the silt curtains averaged about 1.1 mg/L. TSS levels measured inside of, adjacent to and downstream of the silt curtains were consistently higher throughout activated carbon application (Figures A-17 and A-18). The highest levels were, in most instances, observed during the first two days of application (i.e., September 25 and 26). The elevated solids levels on these days were likely attributable to an error in the vertical positioning of the tiller relative to the sediment surface, which likely resulted in the tiller mixing deeper than originally intended (see Section 3.3.3 for details). Upon recognition of this condition, adjustments to the positioning of the tiller were made and activated carbon application resumed. The correction to the vertical location of the tiller contributed to the lower TSS levels that were observed at the local and downstream locations after the first two days of operation (Figures A-16 and A-17). Dilution of suspended solids from the increased river flows (from about 300 cubic feet per second [cfs] on

September 26 to 1,300 cfs on September 30) is another likely contribution to the observed decline in TSS levels over this period. This is based on the fact that monitoring data collected from the river over the past several years has shown that TSS levels remain relatively low, even under high flow conditions (Alcoa, April 2001). Overall, TSS levels measured inside of, adjacent to, and downstream of the silt curtains averaged between 2.3 to 2.8 mg/L (Figure A-18). The consistent trend of increasing TSS levels from the upstream to downstream locations indicates that, although minor, some release of activated carbon and/or surface sediment may have occurred during application.

Turbidity levels also remained relatively low during activated carbon application. The continuous turbidity monitoring activities in the Initial Test Area indicated little to no impact to the water column due to activated carbon application and/or mixing. Turbidity monitoring results during activated carbon application in the mixed tiller cells within the Initial Testing Area averaged 3.5 NTU (baseline reading averaged 3.3 NTU), and turbidity monitoring conducted during application with the tine sled averaged 3.7 NTU. During the routine monitoring activities, turbidity levels measured from September 25-28, 2006 were relatively constant (ranging from about 2.5 to 3.5 NTU) and declined to 0.3 to 0.5 NTU after September 29, 2006 (Figures A-16 and A-17). Similar to the TSS measurements, turbidity levels at the local monitoring stations exhibited a slight decline immediately after the vertical positioning of the tiller was corrected. The decline in turbidity after September 29, 2006 is likely the result of dilution associated with the increased flows experienced during this period. On average, turbidity levels measured inside of, adjacent to and downstream of the silt curtains were similar, ranging from 2.3 to 2.6 NTU (Figure A-18). These average levels were slightly higher than those measured at the upstream monitoring location (2.0 NTU). The turbidity action level of 25 NTU was not exceeded during activated carbon application in the Initial Testing Area.

PCB levels at the upstream, local and downstream locations remained below the detection limit (0.065 micrograms per liter [µg/L]) throughout activated carbon application in the Initial Testing Area.

2.2.1.2.2 Mixed Tiller Treatment Area

TSS levels remained relatively low at all locations throughout activated carbon application and mixing in the Mixed Tiller Treatment Area (Figures A-16 and A-17). TSS levels measured at the upstream monitoring location averaged 1.3 mg/L (range of non-detect to 3.2 mg/L). TSS levels at the local monitoring stations were generally higher and exhibited a continual increase during activated carbon application and mixing, increasing from non-detect to 2.0 mg/L on October 3, 2006 to about 2.8 to 4.4 mg/L on October 9, 2006. Overall, TSS levels at these locations averaged between 2.1 mg/L and 2.3 mg/L during this period (Figure A-18). TSS levels at the downstream monitoring location were slightly lower than those measured at the local stations, but slightly elevated relative to upstream (average of 1.9 mg/L, range of non-detect to 2.4 mg/L).

The trend of increasing TSS levels at these locations indicates that, although minor, some release of solids may have occurred during application. As described in Section 2.2.1.1.2, additional water column monitoring was conducted on October 9 and 10, 2006 to evaluate whether the apparent increase in TSS levels at these locations were the result of activated carbon loss to the water column during application or increased sediment resuspension (see Table A-14). On October 9, in addition to the routine TSS and turbidity monitoring, POC measurements were obtained from the upstream, local and downstream monitoring locations. The POC levels measured inside of and adjacent to the silt curtains were slightly higher than those measured at the upstream location (0.29 to 0.40 mg/L vs. 0.28 mg/L upstream). The POC concentration measured at the downstream location was 0.22 mg/L. On October 10, additional water samples were collected at four locations immediately upstream and downstream of the tiller unit, and from the vent of the tiller unit. The TSS levels measured at these locations were similar to or slightly higher than those measured at the routine local monitoring stations on the same day (range of 2.0 to 3.6 mg/L vs. 2.0 to 2.5 mg/L at the local stations). POC levels exhibited no consistent spatial pattern, and ranged from 0.38 to 0.54 mg/L. The POC measurements collected on both October 9 and 10, 2006 were comparable to those measured in this reach of the river during prior years (0.23 to 0.59 mg/L at WC011; considering the month of October only; 1996-1999). This information, coupled with the additional TSS data, suggest that relatively little loss of activated carbon to the water column occurred during application in the Mixed Tiller Treatment Area.

Turbidity levels followed a similar pattern with comparable averages at the upstream and downstream transects (0.9 and 1.0 NTU, respectively), and slightly higher levels at the local monitoring stations (1.1 and 1.3 NTU inside the curtain; 1.3 NTU outside the curtain). The turbidity action level of 25 NTUs was not exceeded during activated carbon application in the Mixed Tiller Treatment Area.

PCB levels at the upstream, local and downstream locations remained below the detection limit (0.065 μg/L) throughout activated carbon application in the Mixed Tiller Treatment Area.

2.2.1.2.3 Tine Sled Mixed Treatment Area

Only one water column sampling event was conducted during activated carbon application in the Tine Sled Mixed Treatment Area (October 13, 2006). TSS levels measured inside and immediately downstream of the silt curtain were 4.0 mg/L and 5.2 mg/L, respectively. These levels were higher than those measured at all other monitoring locations (1.6 mg/L at the upstream station, 1.6 mg/L at the most upstream local monitoring station, and non-detect downstream). Turbidity levels were higher than levels during tiller application and similar to those observed during activated carbon application in the Initial Testing Area. Turbidity levels were 2.0 NTU at both the upstream and downstream locations, 1.8 and 2.3 NTU just outside the silt curtain, and 2.2 NTU inside the curtain (Figures A-16 through A-18). The turbidity action level of 25 NTUs was not exceeded during activated carbon application in the Tine Sled Mixed Treatment Area.

PCB levels at the upstream, local and downstream locations remained below the detection limit (0.065 μg/L) throughout activated carbon application in the Tine Sled Mixed Treatment Area.

2.2.1.2.4 Unmixed Tiller Treatment Area

Only one water column sampling event was conducted during activated carbon application in the Unmixed Tiller Treatment Area (October 11, 2006). TSS levels were below the detection limit at the upstream monitoring location, as well as the most upstream local monitoring station (i.e., ACPS-1). The highest TSS levels of 2.0 mg/L were measured inside the silt curtain, while the levels measured immediately outside the curtain (at ACPS-2) and at the downstream location were slightly lower (1.6 mg/L) (Figures A-16 through A-18). Turbidity levels followed a similar pattern; levels at the upstream location and the most upstream local monitoring station were 1.3 NTU, while those measured inside of and downstream of the silt curtains were only slightly higher (1.5 NTU). The turbidity action level of 25 NTUs was not exceeded during activated carbon application in the Unmixed Tiller Treatment Area.

PCB levels at the upstream, local and downstream locations remained below the detection limit (0.065 μg/L) throughout activated carbon application in the Unmixed Tiller Treatment Area.

2.2.2 Noise Monitoring

2.2.2.1 Monitoring Activities

Noise levels were monitored during construction activities to assess noise associated with heavy equipment usage and evaluate any potential impacts to the surrounding community. Noise was monitored at three locations including: approximately 500 feet upstream of the pilot study area; adjacent to the pilot study area on the south side of the river; and approximately 1,500 feet downstream of the pilot study area (Locations A through C; Figure A-14). Locations were selected at the northern and southern shorelines adjacent to the closest residence.

Noise monitoring was initially conducted on September 20, 2006 to obtain data on baseline conditions prior to construction activities. Monitoring was then performed daily at the three locations from September 25 to 29, 2006 (during activated carbon placement in the Initial Testing Area). Noise monitoring was also conducted on October 2, 2006 immediately adjacent to the equipment barge to evaluate noise levels in the vicinity of site workers. After an assessment of the data from the Initial Testing Area, monitoring activities were reduced to once per week during construction in the Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas.

Monitoring was conducted using a Q-300 Noise Dosimeter. During each monitoring event, specifics of the measurement location, time of measurement, and meteorological conditions were recorded in the field book.

2.2.2.2 Summary of Results

Noise levels recorded during construction activities were comparable to those measured during baseline monitoring. Since the completion of construction activities, it has been determined that the numeric values obtained during construction were not valid due to a potentially incorrect setting on the meter; values can only be considered in relation to each other. Based on field observations, the noisiest activity associated with the ACPS work was the motor noise of the work boats. Based on previous experience, and considering the proximity of the shoreline receptors to the work area, it is not anticipated that the decibel level associated with the ACPS work posed concern.

2.2.3 Sediment Sampling

2.2.3.1 Monitoring Activities

Sediment samples were collected throughout the ACPS area to verify application of the activated carbon within the targeted placement areas and depth, as well as quantify the amount of activated carbon placed. As described in the Work Plan (Alcoa, August 2006), initial verification in the field was intended to be achieved through visual inspection of the sediment cores collected immediately after activated carbon application. Laboratory analysis for TOC (via the Lloyd Kahn method) was also planned to confirm the visual observation and to quantify the activated carbon applied to the sediments. Subsequent to the submission of the Work Plan, the procedures for two semi-quantitative visual field verification methods were developed: 1) sediment washing, which relied on the rinsing of the sample to remove fine-grained sediments that might otherwise conceal the presence of the applied activated carbon, followed by a visual (semi-quantitative) comparison of the activated carbon content with standards for different activated carbon doses; and 2) sediment sieving, which involved particle size separation to remove fine-grained particles, followed by a visual (semi-quantitative) comparison to laboratory-prepared standards. In addition, subsequent to the Work Plan, laboratory analysis methods for initial activated carbon screening (BC-T) and confirmatory black carbon measurements (BC-C) were proposed to quantify the increase in activated carbon over baseline levels with greater confidence. The methodologies used for sediment core collection, processing, and analysis are described in Section 2.2.3.1.1, and the sampling locations and rationale for collection are presented in Section 2.2.3.1.2.

2.2.3.1.1 Sediment Sampling Methodology

During-application sediment sampling was conducted using manual core collection techniques consistent with the methodology utilized for baseline sediment sampling (see Section 2.1.5). Cores were advanced into the sediment to refusal or to a depth necessary to achieve adequate recovery, depending on core processing/analytical requirements for each individual core. The retrieved core was then split open along the length of the core tube with visual descriptions recorded (consistent with Section 2.1.5), and segmented 0 to 3 inches, 3 to 6 inches, and for select cores, 6 to 12 inches and beyond depending on sampling requirements. Segments were then prepared for visual observation and/or submittal for laboratory analysis as described below.

Visual Observation

Cores were primarily collected for visual observation during the beginning stages of the project (i.e., during application in the Initial Testing Area) in an attempt to provide real-time feedback regarding the presence/absence of activated carbon immediately after placement. Samples that were targeted solely for visual observation were thoroughly homogenized in a disposable container. Following homogenization, two methods (washing and sieving) were utilized to prepare the sample for visual observation against laboratory-prepared standard samples containing known percentages of carbon (0, 2.5, and 5 percent carbon by dry weight). Both methods were attempted in the field in an effort to optimize the semi-quantitative visual field verification methods process based on field conditions encountered. The steps for each method are provided below.

Washing:

1. Place about 20 ml of sediment into a 500 ml plastic beaker (or equivalent);
2. Add approximately 300 ml of river water;
3. Stir well to create slurry;
4. Allow slurry to settle for about 10 seconds;
5. Decant the supernatant water containing clays and fine silt;
6. Repeat procedure up to 5 times as necessary to remove most of the clay and fine silt (the coarse silt and sand should be visible as a distinct layer that settles readily);
7. Transfer the settled material after washing into a labeled glass vial; and
8. Rinse the plastic beaker thoroughly with river water prior to preparing next sample.

Sieving:

1. Place 20 ml of sediment into a 250 micron sieve;
2. Perform wet sieving with river water to remove clays and fines;
3. Transfer coarse particles retained in the sieve to a plastic beaker using a stream of water from a squirt bottle or beaker;
4. Pour the coarse particles from the plastic beaker to a glass vial for observation; and
5. The presence of activated carbon can be best visualized from the bottom of the vial.

The “washed” or “sieved” samples were then reviewed to evaluate the presence/absence of activated carbon. These prepared samples were also subjectively compared against a set of laboratory prepared calibration standards (prepared by UMBC) to attempt to semi-quantitatively estimate the percentage of activated carbon in the sample. As discussed in Section 3.3 of the main body of this ACPS Construction Documentation Report, the results of the initial visual observations were inconclusive and therefore the visual verification methods were abandoned in the Initial Testing Area.

Laboratory Analysis

Cores were collected for laboratory analysis throughout the duration of the ACPS to provide quantitative data on the amount of activated carbon placed in the treatment areas during and immediately following application activities. Cores were primarily collected from a single location at each targeted sampling location; however, some locations within the Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas were sampled by collecting multiple cores from within a localized area and compositing sampling intervals to generate one sample per interval (referred to as a 5-point composite sampling locations as further described in Section 2.2.3.1.2).

Samples obtained from the cores were submitted to NEA for TOC, percent moisture, and bulk density analyses, as well as black carbon (BC-T) screening analysis (for the majority of samples). In addition, aliquots of each sample were collected where sample volume permitted and archived for future testing (see Section 2.2.3.2.1). Results of analytical tests were provided on an accelerated turn-around-time (TAT; i.e., 24 hours or less) so that the information could be used for near real-time decision making in the field. To achieve this accelerated TAT, samples were collected from the pilot study area, processed, and transferred to a courier at 4 pm each day. The courier then delivered the samples to NEA by 9 pm that same evening. NEA then analyzed the samples providing TOC, percent moisture, and bulk density results via email by 8 am the next morning. Black carbon (BC-T) screening analyses were conducted concurrently and results were received by 5 pm the day after sampling. Towards the end of the pilot study, the TAT was reduced to standard (10 business days) as the data were no longer needed real-time to make construction decisions.

Overall, 252 locations were sampled, resulting in a total of 342 samples (see Table A-1) for laboratory analysis during application activities. In addition, 24 blind duplicates (including 1 blind duplicate per every 20 sediment samples) were collected for QA/QC. Additional information on the number of cores and samples collected from each treatment area are provided in Section 2.2.3.1.2. Details on the QA/QC analyses and results are presented in Attachment A-1.

Subsequent to completion of the 2006 field implementation activities, 114 selected sediment samples collected and archived from the Mixed Tiller, Tine Sled and Unmixed Tiller Treatment Areas were analyzed at UMBC using the refined black carbon-chemical preoxidation (BC-C) method (see Attachment A-3). These samples included all of the 5-point composite samples as well as select samples from the single point core locations that provided even spatial distribution within the treatment areas. This analytical technique was not fully developed until after construction activities in the river were completed and, thus, these data were not used to make construction-related decisions in the field. The black carbon (BC-C) results are discussed in more detail in the sections below.

2.2.3.1.2 Sediment Sampling Objectives and Locations

Sediment cores were collected on a daily basis as soon as was safely possible following activated carbon application in the individual application cells or lanes. The actual time period between carbon application and sediment sampling varied during the study. Specifically, initial sampling in the Mixed Tiller Treatment Area was typically conducted one to two working days after carbon application in a particular cell (with some sampling occurring on the same day as carbon application); however, as the sampling program evolved, re-sampling of the tiller cells in this area was conducted up to approximately one week after carbon application. In the Unmixed Tiller Treatment Area, sediment sampling was performed one to three working days after completion of carbon application, and Tine Sled Mixed Treatment Area sampling activities were completed two to three working days after carbon application.

In general, the targeted post-application sampling locations included those locations sampled during the baseline monitoring event (Section 2.1.5). However, additional sediment sampling locations were added in the treatment areas following the start of activated carbon application to obtain additional data. Therefore, baseline sediment samples were not available for all locations sampled after activated carbon application.

Note also that as described in Section 3.3.1 of the main body of this ACPS Construction Documentation Report, overlap areas were created during carbon application to promote complete coverage of the treatment areas for quality control purposes. These areas included approximately 6 inches of overlap on all sides of an application cell during tiller application (approximately 10 to 20 percent of the total area), and 1 foot of overlap during tine sled application (approximately 15 to 30 percent of the total area). Although not specifically targeted during sampling, approximately 15 percent of the post-application sediment cores were collected within an overlap area as shown on Figures A-15, A-19, and A-20. In the Mixed Tiller, Unmixed Tiller, and Tine Sled Mixed Treatment Areas, a majority (95%) of these cores were combined with samples from outside the overlap areas prior to analysis (i.e., 5-point composites). Therefore, an evaluation of whether these samples incurred a more significant increase in carbon with respect to samples collected outside of the overlap areas could not be conducted. In the Initial Testing Area, sufficient black carbon (BC-C) data are unavailable for samples collected from within the overlap areas to accurately estimate the effects of possible double dosing.

Sediment sampling objectives and locations for each treatment area are described below.

Initial Testing Area

Post-application sediment sampling was initiated on September 25, 2006 in the Initial Testing Area with collection continuing on a daily basis until October 3, 2006; one additional sampling event was performed on October 6, 2006. As indicated above, cores were collected for visual observation and laboratory analysis. Two cores were collected for visual observation only on September 25, 2006 from two of the three first tiller mixed cells completed (MIX TU1-N1 and MIX TU1-N3; Figure A-15). Coordinates for sample collection were provided by the contractor representing the center of the completed tiller application cell. Due to the limited success of the visual observation washing/sieving method (further described in Section 2.2.3.2), the collection of cores for the purposes of visual observation ceased. The washing/sieving method was attempted on homogenized materials from cores collected for laboratory analysis, but again with limited success.

Cores for laboratory analysis were collected from each tiller application cell and tine sled lane completed in the Initial Testing Area (note that not all tiller application cells were completed in the Initial Testing Area). Core collection was completed as safely permitted after activated carbon application activities such that the cores could be visually observed and/or submitted for laboratory analysis to evaluate the effectiveness of activated carbon application using each application technique to aid in future construction decisions. A total of 60 cores were collected from the Initial Testing Area (Figure A-15). In general, cores were collected from the same locations targeted during the baseline sediment verification coring sampling event (Section 2.1.5). Note that cores were collected at eight baseline sediment core locations (as indicated on Figure A-15) during two separate sampling events to obtain additional data from these application cells. In addition, four additional cores were collected around location TEST-AM-02 (four cores identified using the same location identifier with an A, B, C, or D) to evaluate potential spatial variation in activated carbon application across the cell.

Vertical sample intervals varied within the Initial Testing Area. Samples from cores collected on September 26 and 27, 2006 from the Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas were sectioned into 0 to 3 inches and 3 to 6 inches intervals consistent with the baseline sampling. However, samples from cores collected on September 28 through October 3, 2006 from the Mixed Tiller, Tine Sled Mixed, and Unmixed Tiller Treatment Areas were obtained up to depths of 24 inches in an effort to evaluate the depth of activated carbon application.

On September 28, 2006, while work proceeded in the Initial Testing Area, a core was collected from the Mixed Tiller Treatment Area from location MTA-1 prior to activated carbon application in this area. This core was collected to evaluate whether carbon was potentially being transported upstream during application activities in the Initial Testing Area. The core was segmented 0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and 18 to 22 inches (4 samples) and submitted to NEA for TOC, percent moisture, bulk density, and black carbon (BC-T) screening analyses.

A total of 169 samples (plus 10 blind duplicate QA/QC samples) were collected from the Initial Testing Area. TOC, percent moisture, bulk density, and black carbon (BC-T) screening analyses were performed on 157 of these samples, while the remaining 12 samples (all from cores collected on October 3, 2006 from the 6- to 12-inch sampling interval) were archived for potential future analysis.

Mixed Tiller Treatment Area

Sediment sampling in the Mixed Tiller Treatment Area was conducted daily from October 4-13, 2006. Consistent with sampling in the Initial Testing Area, cores were collected from the same 16 locations targeted during the baseline sediment verification sampling event (Section 2.1.5). In addition to these core locations, multiple single point and composite sampling locations were added to obtain additional data within the Mixed Tiller Treatment Area (Figure A-19) to assess activated carbon application and spatial variation within the treatment cells. Fourteen new single point core locations were added throughout the Mixed Tiller Treatment Area (MTA-17 through MTA-30; Figure A-19), for which baseline data were not collected. Similar to the sampling in the Initial Testing Area, four additional single point cores were collected around a previously identified baseline core location at two locations (MTA-17 and MTA-18; Figure A-19). In total, 39 single point core locations were sampled in the Mixed Tiller Treatment Area. Composite cores were also collected from 10 locations (Figure A-19). These samples consisted of the collection of cores at five locations within a single tiller application cell, with sediments from each core composited into a single sample based on the sampling depth interval (i.e., 5-point composite samples). These 5-point composite samples were collected from a square area approximately 3 feet by 3 feet in dimension (cores were collected from each corner point and also the center). A total of 88 cores were collected from the Mixed Tiller Treatment Area.

Sample intervals included 0 to 3 inches, 3 to 6 inches, and 6 to 12 inches for cores collected October 4-10, 2006, and 0 to 3 inches and 3 to 6 inches for cores collected on October 11, 2006. Samples collected from the 0- to 3-inch and 3- to 6-inch segments on October 4-10, 2006 were submitted for TOC, percent moisture, bulk density, and black carbon (BC-T) screening analyses, with the 6- to 12-inch interval held for potential future analyses. All samples collected on October 11, 2006 were submitted for TOC, percent moisture, and bulk density analyses, with a portion of the samples held for potential future analysis.

A total of 139 samples (plus 10 blind duplicate QA/QC samples) were collected from the Mixed Tiller Treatment Area and submitted to NEA for analysis. TOC, percent moisture, bulk density, and black carbon (BC-T) screening analyses was performed on 98 samples (black carbon analysis was held on 20 samples), while 41 samples were held for potential future analysis. On October 31, 2006, 10 of the held samples were requested for TOC, percent moisture, and bulk density analysis.

Tine Sled Mixed Treatment Area

Sediment sampling in the Tine Sled Mixed Treatment Area was conducted October 17 and 18, 2006. Similar to the other treatment areas, single point cores were collected from nine of the locations targeted during the baseline sediment verification cores sampling event (Section 2.1.5; Figure A-20). In addition to the single point cores, additional cores were collected for compositing at each location. At the composite location, a co-located core was collected with the single point core location, and four additional cores were collected around the center location. Sediments from each core were composited based on the depth interval, resulting in a total of nine 5-point composite samples (Figure A-20). A total of 54 cores were collected from the Tine Sled Mixed Treatment Area.

Cores were segmented 0 to 3 inches, 3 to 6 inches, and 6 to 12 inches in the Tine Sled Mixed Area with the following submitted for analysis: 0- to 3-inch and 3- to 6-inch segments were submitted for TOC, percent moisture, and bulk density analyses; 6- to 12-inch segment was held for potential future analysis; and a portion of all segments were held for potential future analyses. A total of 36 samples (plus one blind duplicate QA/QC sample) were collected from the Tine Sled Mixed Treatment Area, and nine samples were held for future analysis. On October 31, 2006, the nine held samples were requested for TOC, percent moisture, and bulk density analyses.

Unmixed Tiller Treatment Areas

Sediment sampling in the Unmixed Tiller Treatment Area was conducted October 13-16, 2006. Single point cores were collected from four of the locations targeted during the baseline sediment verification cores sampling event (Section 2.1.5; Figure A-20). Three of the 16 baseline locations fell within the buffer zone between the Tine Sled Mixed and Unmixed Tiller Treatment Areas and, as a result, four additional single point core locations were added to the Unmixed Tiller Treatment Area during construction to obtain adequate representation of the area (Figure A-20). In addition to the single point cores, additional cores were collected for compositing at each location. At the composite location, a co-located core was collected with the single point core location, and four additional cores were collected around the center location. Sediments from each core were composited based on the depth interval, resulting in a total of eight 5-point composite samples (Figure A-20). A total of 48 cores were collected from the Unmixed Tiller Treatment Area.

Cores were segmented 0- to 3 inches and 3- to 6 inches, with all segments submitted for TOC, percent moisture, and bulk density analyses, and a portion of all segments held for potential future analyses. A total of 32 samples (plus three blind duplicate QA/QC samples) were collected from the Unmixed Tiller Treatment Area.

A summary of the single point and 5-point composite cores for each treatment area, along with a listing of archived core samples (not including QA/QC samples) is presented on Table A-15.

As discussed in Attachment A-3, subsequent to completion of the pilot study, UMBC developed the black carbon-chemical preoxidation (BC-C) verification method, which quantifies black carbon by oxidizing most of the natural organic carbon, preserving the majority of the activated carbon added to the sample. This measurement technique was subsequently used to verify black carbon (BC-C) levels in 114 archived sediment samples collected from the river after activated carbon application.

2.2.3.2 Summary of Results

Results for the sediment samples collected after activated carbon application in the Initial Testing, Mixed Tiller, Tine Sled Mixed and Unmixed Tiller Treatment Areas are presented in Tables A-16, A-17, A-20, and A-23, respectively.

Overall, as discussed in more detail in the main body of this report, the sediment core data collected immediately after activated carbon application suggest that the tine sled and tiller application techniques were successful at delivering the target dose of 2.5% (by weight) to the surface sediments, with average increases in TOC levels of 2.7 to 4.7% and confirmatory black carbon (BC-C) levels of 3.2 to 5.3% (based on post-application 5-point composite samples) achieved during the study. A detailed discussion of sediment data collected immediately after activated carbon application in each of the test areas is provided below.

2.2.3.2.1 Verification of Carbon Delivery

As described in Section 2.2.3.1, verification of mixing of the activated carbon within the top three inches of the sediment column was accomplished through sediment sampling followed by semi-quantitative visual observations and quantitative laboratory analyses to estimate the increase in TOC and/or black carbon (BC-T and BC-C methods) over baseline levels. During the initial stages of the in-river testing, it appeared that the use of the black carbon (BC-T) screening method could potentially provide a suitable indicator of the amount of activated carbon that was added to the surface sediments. This belief was based on the following observations:

1) The semi-quantitative visual comparison of washed or sieved sediment samples to known standards was subjective and yielded inconsistent results;
2) Natural TOC levels in surface sediments collected from the ACPS area during baseline monitoring were variable throughout the ACPS area and exhibited no consistent spatial trend; and
3) Black carbon (BC-T) screening levels (measured using the 375^{o}C pre-combustion treatment) in sediment samples collected during baseline monitoring were less variable than natural TOC levels and relatively uniform throughout the ACPS area.

Since NEA was able to return both TOC and black carbon (BC-T) screening measurements within the desired 24-hour TAT, both parameters were maintained in the daily sediment sampling and analysis efforts.

However, during the ACPS, an analytical issue in the quantification of black carbon (BC-T) levels in sediments using the thermal pre-combustion method was identified. Specifically, results of the black carbon (BC-T) screening analyses performed by NEA (using the 375^{o}C pre-combustion treatment) showed only marginal increases in black carbon (BC-T) levels after carbon application, while increases in TOC levels were observed. The apparent differences between reported changes in black carbon and TOC levels led to the review of the black carbon (BC-T) screening technique developed by UMBC and subsequently modified by NEA to achieve 24-hour TATs for "real-time" field decision making. For this investigation, NEA spiked sediment samples with known amounts of black carbon and analyzed the spiked samples to determine the recovery efficiency of the analytical method. Results of these spiked sample analyses indicated that the black carbon (BC-T) screening method yielded low and inconsistent results. Initial results of matrix spike experiments using Carbsorb 50x200 (not acid washed) manufactured by Calgon Carbon Corporation (Calgon) showed recoveries of 96% and 76% for 2.5% and 5% activated carbon amendments (by weight), respectively. Tests performed later with the acid washed Carbsorb activated carbon used in the Initial Testing and Mixed Tiller Treatment Areas showed lower recoveries (around 50%) when spiked into river sediment. However, tests with the pure Carbsorb material showed higher recoveries (above 80%) when not mixed with river sediment. NEA also reported that the spike recovery of the coconut shell-based activated carbon provided by Calgon for use in the Tine Sled Mixed and

Unmixed Tiller Treatment Areas was even lower (40-50%). Additional testing by UMBC and follow-up conversations with Calgon identified potentially significant differences in the carbon autoignition temperatures and acid-washing of the activated carbon as factors that may have contributed to the low recoveries observed in the spiked samples.

To further investigate the low black carbon recoveries using the BC-T screening method, inter-laboratory comparisons of sediment split samples were performed. For these comparisons, Grasse River sediment samples collected after activated carbon application in the field were split and provided to NEA, UMBC, and the University of North Dakota (UND) for black carbon (BC-T) screening analysis. The procedures employed by each laboratory were generally the same, although some differences were noted. Figure A-21 presents a comparison of the black carbon (BC-T) screening analysis of sediment samples from the three laboratories. The measured values are variable, but are in the same range for tests conducted at UMBC and NEA. Results from UND showed lower black carbon (BC-T) screening values, possibly due to the longer pre-combustion time relative to UMBC and NEA. The 350^{o}C pre-combustion treatment consistently provided higher black carbon measurements. Efforts to further understand these analytical issues continued throughout and after the in-river portion of the ACPS, as described below.

Despite the difficulties in obtaining reliable results, black carbon (BC-T) screening measurements were nevertheless performed throughout most of the ACPS construction period. These results were considered along with other available data (e.g., TOC measurements; see below) to support an evaluation in "real-time" for in-field decision making purposes. Given the issues with the visual observation and black carbon (BC-T) screening approaches (as discussed above), TOC measurements were used as the key metric for obtaining quantitative information to help support in-field decision making. For this reason, and given the variability in the baseline natural TOC levels in the sediments from the ACPS area, a weight of evidence approach to assessing the amount of activated carbon applied to the sediments was developed. The weight of evidence approach was termed the "three method average delta," and represented an average of three methods of evaluating the increase in TOC levels associated with the activated carbon application:

1) Post-Pre Station Delta: location-by-location comparison of pre- and post-application TOC levels. This value was computed by subtracting the TOC level in the surface (0 to 3 inches) sediment samples collected during baseline monitoring from the post-application surface sediment TOC level measured at the same location. Only cores with paired pre- and post-application TOC measurements were used to calculate this metric.

2) Post-Pre Average Delta: comparison of the post-application surface (0 to 3 inches) sediment TOC level at a particular location to the average surface sediment TOC level for the ACPS area determined during baseline monitoring. This comparison was made to account for the variability in TOC levels in surface samples from the ACPS area, and was computed by subtracting 5.4% from the post-application surface sediment TOC measured in each post-application core.

3) Surface-Deep Delta: comparison of the post-application surface (0 to 3 inches) sediment TOC level at a particular location to the post-application TOC level in the 3- to 6-inch sample interval for the same location. This comparison assumed that most of the activated carbon was delivered to the top 3 inches of the sediment, and that relatively small amounts of activated carbon were mixed below 3 inches (which was generally corroborated by testing data; see below). Thus, the 3- to 6-inch sample interval was used as a surrogate baseline estimate, given that no significant difference in baseline TOC levels was observed between surface and deeper sediments (see Section 2.1.5.2).

In the absence of a reliable black carbon (BC-T) screening technique during the field application of activated carbon to the river sediments, the three-method average TOC delta methodology outlined above provided a semi-quantitative means by which to evaluate the ability of the application and mixing equipment to deliver activated carbon to the surface sediments, and was used during activated carbon application to help guide decision making in the field. As indicated above, after construction was completed, laboratory studies continued to work towards an understanding of the analytical issues associated with the quantification of the amount of activated carbon applied to the river sediments. The ultimate goal of this work was to develop a reliable, accurate means of measuring activated carbon levels in the Grasse River sediments (both pre- and post-application). These studies led to the development of the black carbon-chemical preoxidation (BC-C) verification method at UMBC, which quantifies black carbon by oxidizing most of the natural organic carbon, preserving the majority of the activated carbon added to the sample (see Attachment A-3). This measurement technique was subsequently used to verify black carbon (BC-C) levels in select archived sediment samples collected from the river prior to and after activated carbon application. These black carbon (BC-C) data are used in this report to verify field conclusions developed using the standard TOC (three-method average delta) results and assess with greater confidence the ability of the application techniques to deliver activated carbon at the desired dose to surface sediments in the ACPS area.

2.2.3.2.2 Initial Testing Area

The Initial Testing Area served as the trial area for testing combinations of operational parameters (i.e., carbon dose, elevation of tiller unit above the sediment surface, and equipment type) in the field prior to activated carbon application in the treatment areas. A total of 10 combinations of operational parameters were tested (see Figure A-15). The TOC data for the sediment samples collected during this testing are tabulated in Table A-16 and presented graphically in Figures A-22 and A-23. Note that the three-method average delta metric that was used to assess the carbon delivery of the equipment under various combinations of operating parameters was developed after testing was complete in the Initial Testing Area and, thus, only TOC data are presented for this area. In addition, archived samples from this area were not analyzed for black carbon (BC-C) levels using the chemical preoxidation technique refined after field implementation of the ACPS. Finally, one sediment core was collected from the Mixed Tiller Treatment Area (location MTA-1) on September 28, 2006, while work proceeded in the Initial Testing Area, to evaluate whether activated carbon was potentially being transported upstream during application activities in the Initial Testing Area. The TOC results for this core were relatively similar throughout the top two feet (ranging from 6.1% to 6.4%) and within the range of baseline TOC levels observed in the pilot study area, suggesting that substantive upstream transport of activated carbon during application in the Initial Testing Area and subsequent deposition into the Mixed Tiller Treatment Area was not occurring.

Average post-application TOC levels measured in surface sediments from the Initial Testing Area are presented for each combination of operational parameters tested during this phase of the study in Figure A-22. Average surface sediment TOC levels collected after application and mixing of activated carbon using the tiller unit were lowest during the first few days of testing (6.3% and 5.8% for operating parameter combinations 1 and 2, respectively). These lower levels are attributable to the error in the vertical position of the tiller unit, which resulted in the application and mixing of activated carbon deeper into the sediment bed than originally anticipated. Average TOC levels measured after this positioning error was identified and corrected were consistently higher (6.7 to 7.7%), due in part to the correction of the positioning error and the delivery of a double dose of activated carbon to the surface sediments (see Figure A-22). Overall, no significant differences in surface sediment TOC levels were observed between the various combinations of operating parameters that were employed with the tiller unit.

Average surface sediment TOC levels collected in areas where the tiller unit applied activated carbon to the surface sediments without mechanical mixing were similar for each combination of operating parameters (averages of 6.0%, 5.8%, and 6.3% for operating parameter combinations 6, 7 and 8, respectively; see Figure A-22).

Average surface sediment TOC levels collected after application and mixing of activated carbon using the tine sled were higher for the double dose, 5 feet per minute (ft/min) application rate (8.9%; operating parameter combination 10) relative to the single dose, 10 ft/min application (6.7%, operating parameter combination 9; see Figure A-22). However, given the overlap in the error bars (representing 95% confidence intervals), these differences were not statistically significant.

A comparison of the TOC levels in the surface sediments to those measured in the deeper sediments (i.e., 3 to 6 inches) is provided in Figure A-23. TOC levels in the surface sediments were, with the exception of a few sampling locations, higher than those measured in the 3- to 6-inch intervals. This information, coupled with the observation that TOC levels in the surface and deeper sediment samples collected during baseline monitoring were relatively similar, suggests that the various application equipment and methods employed in the Initial Testing Area were successful at delivering activated carbon to the surface sediments more so than to the deeper sediments. None of the application equipment tested during these initial trials warranted exclusion from full-scale application. Therefore, the three primary application techniques (application/mixing with the tiller unit, application only [no mixing] using the tiller unit, and application/mixing with the tine sled) were carried forward and employed during subsequent field activities in the mixed and unmixed treatment areas.

2.2.3.2.3 Mixed Tiller Treatment Area

Based on the performance of the tiller unit in the Initial Testing Area, application of a 1.5x dose of activated carbon approximately 0.3 feet above the sediment surface was carried forward into the larger-scale operation in the Mixed Tiller Treatment Area. However, additional testing was conducted to evaluate the effects of varying tiller rotational speed (revolutions per minute [RPM]), settling time (time after application that unit remains in place before lifting from the surface sediment) and additional mixing with the tiller unit. A total of eight combinations of operational parameters were tested in the Mixed Tiller Treatment Area (see Figure A-19). The TOC data for the sediment samples collected during this testing are presented in Table A-17.

Increases in surface sediment TOC levels, as determined using the three-method average delta metric for single-point and 5-point composite samples, for each combination of operational parameters tested in the Mixed Tiller Treatment Area during this phase of the study are presented in Figure A-24. Five of the eight combinations tested in the Mixed Tiller Treatment Area resulted in average carbon increases that were close to or exceeded the target increase of 2.5% above baseline conditions (2.2 to 3.4%). No significant differences in increased TOC levels were observed between these five combinations of operating parameters. The other three combinations of operating parameters (2 and 3, which mixed at higher RPMs and had 10-minute settling time, and 7 which mixed at low RPMs and had a 15-minute settling time), exhibited only marginal increases in TOC post-application. The confirmatory black carbon BC-C levels measured in single-point and 5-point composite samples using the chemical preoxidation technique at UMBC yielded similar results, although the increases in black carbon (BC-C) levels due to the application of activated carbon were slightly greater than those estimated using the standard TOC three-method average delta metric (Figure A-25).

A comparison of the increases in surface TOC levels from the single point and 5-point composite samples is presented in Figure A-26. With the exception of a single location (MTA-02), the increases in TOC were higher for the 5-point composites relative to the single point samples. Comparison of confirmatory black carbon (BC-C) levels in the single point and 5-point composite samples exhibit a similar relationship; black carbon (BC-C) levels for the 5-point composites were similar to or greater than those measured in the single point samples (Figure A-27). These results indicate that small-scale variability inherent to the application process exists within the tiller footprint and that the 5-point composite samples provide a more representative average for the tiller footprint (relative to the single point samples). Overall, 70% and 90% of the 5-point composite samples exceeded carbon doses of 2.5% and 1.0%, respectively, based on post-application TOC levels (see Tables A-18 and A-19, and Figure A-26, panel b). Likewise, 70% and 100% of the 5-point composite samples exceeded carbon doses of 2.5% and 1.0%, respectively, based on post-application BC-C levels (see Tables A-18 and A-19, and Figure A-27, panel b). In the single point samples, 26% and 49% exceeded carbon doses of 2.5% and 1.0%, respectively, based on post-application TOC levels, and 20% and 75% of the single point samples exceeded carbon doses of 2.5% and 1.0%, respectively, based on post-application BC-C levels (see Tables A-18 and A-19, and Figures A-26 and A-27, panel b).

A comparison of the TOC levels in the surface sediments to those measured in the deeper sediments (i.e., 3 to 6 inches) is provided in Figure A-28. TOC levels in the surface sediments were, with the exception of a few sampling locations, higher than those measured in the 3- to 6-inch intervals. Similarly, black carbon (BC-C) levels measured in the surface samples were consistently higher than those in the deeper sediments (Figure A-29). This, coupled with the observation that both TOC and black carbon (BC-C) levels in the surface and deeper sediment samples collected during baseline monitoring were relatively similar, suggests that the various combinations of operating parameters employed in the Mixed Tiller Treatment Area were successful at delivering activated carbon to the surface sediments (relative to mixing into deeper sediments).

2.2.3.2.4 Tine Sled Mixed Treatment Area

Samples from station 'TSUTA-8'(Figure A-20) were collected from outside of the treatment area and, thus, are not representative of treated sediments (surface TOC levels for the 5-point composite and single point samples collected at this location were 3.7% and 3.9%, respectively). For this reason, results from this location are excluded from all calculations and figures, as well as the discussion below. In addition, only the 5-point composite samples and one blind duplicate of a single point sample were analyzed for confirmatory black carbon (BC-C) analysis and, thus, a comparison of black carbon (BC-C) levels between single point and 5-point composite samples was not performed.

Post-application surface TOC levels were higher, on average, in the 5-point composite samples (8.1%; range of 4.8 to 12.0%), than in the single point samples (7.7%; range of 4.4 to 11.0%; see Table A-20). Both sampling methods indicate similar differences in TOC between the surface and deeper sediments, suggesting that surface sediments were, on average, about 1.3 times higher than those in the 3- to 6-inch interval. TOC levels in these deeper sediment samples averaged 5.5% (range of 3.4 to 7.6%) and 6.2% (range of 4.6 to 9.0%) for the 5-point composites and single point samples, respectively (see Figure A-30). Confirmatory black carbon (BC-C) levels in the 5-point composite surface sediments were also higher than those measured in the deeper sediments (Figure A-31). This information, coupled with the observation that TOC and black carbon (BC-C) levels in the surface and deeper sediment samples collected during baseline monitoring were relatively similar, suggests that the application methods employed in the Tine Sled Mixed Treatment Area were successful at delivering activated carbon to the surface sediments (relative to mixing into deeper sediments).

Using the three-method average delta (as discussed above), surface TOC levels in the 5-point composite samples indicate an increase in carbon of about 2.6% (range of -0.5 to 7.8%), with 25% and 87% of the samples exhibiting an increase in TOC of 2.5% and 1.0% (see Tables A-21 and A-22, and Figure A-32). The confirmatory black carbon (BC-C) results indicate an overall average increase of 3.2% (range of 1.4 to 6.5%), with 63% and 100% of the 5-point composite samples exceeded carbon doses of 2.5% and 1.0%, respectively (see Tables A-21 and A-22, and Figure A-33).

Surface TOC levels in the single point samples were slightly lower, exhibiting increases in carbon of, on average, 2.1% (range of -1.1 to 4.2%). Fifty percent of the single point samples showed an increase in carbon in excess of 2.5%, while 75% of the samples exhibited increases of 1.0% or more (see Figure A-32). A comparison of analytical methods could not be made for the single-point samples, as the black carbon (BC-C) data for single point cores is limited to one field duplicate measurement (2.8%). No consistent spatial trend in TOC, the three-method average delta, or confirmatory black carbon (BC-C) levels was observed within the Tine Sled Mixed Treatment Area.

2.2.3.2.5 Unmixed Tiller Treatment Area

For post-application samples collected from the Unmixed Tiller Treatment Area, only the 5-point composite samples and three blind duplicate samples of single point samples were submitted for confirmatory black carbon (BC-C) analysis at UMBC. As these duplicate samples were originally taken from single point cores, their black carbon (BC-C) results are used to represent single point samples for the purpose of comparison to the 5-point composite samples.

Post-application surface TOC levels were higher, on average, in the 5-point composite samples (10.0%; range of 5.3 to 15.0%), than in the single point samples (7.9%; range of 5.4 to 12.0%; see Figure A-34). TOC levels at depth (3-6 inches) were, on average, about 1.7 times lower than levels at the surface. Overall, TOC levels at depth in the 5-point composites and single point samples averaged 5.3% (range of 4.0 to 6.5%) and 5.7% (range of 4.9 to 7.4%), respectively (see Table A-23). Confirmatory black carbon (BC-C) results for the surface and deeper sediments collected from the Unmixed Tiller Treatment Area are only available for 5-point composite samples. Black carbon (BC-C) levels in the surface sediments averaged 5.4%, which is significantly higher that the average black carbon (BC-C) level measured in the deeper sediments (0.15%; Figure A-35). This information, coupled with the observation that TOC and black carbon (BC-C) levels in the surface and deeper sediment samples collected during baseline monitoring were relatively similar, suggests that the application methods employed in the Unmixed Tiller Treatment Area were successful at delivering activated carbon to the surface sediments (relative to mixing into deeper sediments).

Using the three-method average delta (as discussed above), surface TOC levels in the 5-point composite samples indicate an increase in carbon of about 4.7% (range of 0.6 to 9.9%), with 75% and 88% exceeding carbon doses of 2.5% and 1.0%, respectively (see Tables A-24 and A-25, and Figure A-36). The confirmatory black carbon (BC-C) results for the 5-point composite samples averaged 5.3% (range of 0.6 to 10.1%), with 63% and 87% of the samples exceeding carbon doses of 2.5% and 1.0%, respectively (Figure A-37).

Surface TOC levels in the single point samples were typically lower than the 5-point composite samples, exhibiting increases in carbon of, on average, 2.4% (range of 0.3 to 6.1%). Twenty five percent of the single point samples showed an increase in carbon greater than 2.5%, while 87% exhibited increases of 1.0% or more. The increase in black carbon (BC-C) in the single point samples averaged 4.5% (range of 1.9 to 5.9%), with 67% and 100% of the samples exceeding carbon doses of 2.5% and 1.0%, respectively. Although data are limited, increases in black carbon (BC-C) in these samples were similar to those for the 5-point composite samples.

No consistent spatial trend in TOC, the three-method average delta, or confirmatory black carbon (BC-C) levels was observed within the Unmixed Tiller Treatment Area in either the single point or 5-point composite samples.

2.3 Longer-Term Monitoring

Post-application monitoring will be conducted to assess the effectiveness of the application/mixing process, the erosion potential of the treated sediments, recolonization of the pilot study area by benthic organisms, and reduction in PCB bioaccumulation in benthic worms. Sediment cores to be used in the laboratory aqueous equilibrium and PCB uptake studies will also be collected during these surveys. In general, the components of the program will include benthic invertebrate community studies, qualitative habitat survey, sediment sampling (physical and chemical characterization), and field and laboratory biological studies. Post-application monitoring will be conducted approximately 12 and 24 months after activated carbon application activities (i.e., August-September 2007 and 2008). Additional details are provided in Section 5 of the main body of this ACPS Construction Documentation Report.

3. References

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Tables

Table A-1
2006 ACPS Data Collection Summary

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Event	Number of Sampling Events	Number of Locations	Number of Samples [1]	Analyses
BASELINE MONITORING [2]				
Erosion Potenial Testing	1	5	40	- erosion potential, TSS of overlying water
Benthic Invertebrate Community/Aquatic Habitat Survey	1	10	10	- invertebrate species composition, biomass, TOC, grain size
Biological Studies	1 1	7 16	7 16	- in-situ PCB uptake - aqueous equilibrium, PCB desorption, PCB uptake
Sediment [3]	1 1	9 86	54 150	- PCB congeners, microscopy examination, black carbon (BC-C, 36 select samples) - TOC, bulk density, moisture content, black carbon (BC-T, 104 select samples)
DURING-CONSTRUCTION MONITORING [4]				
Water Column [5]	20 1 1	5 5 3	85 5 5	- PCB Aroclor, TSS - POC (upstream/downstream transects and local monitoring locations) - POC (within Mixed Tiller Treatment Area; immediate vicinity of tiller)
Sediment [3]	continuous	252	342	- TOC, bulk density, moisture content, black carbon (BC-T, 235 select samples; BC-C, 114 select samples)

Notes:

1. Count does not include QA/QC samples (i.e., duplicates, matrix spike/matrix spike duplicates, and rinse blanks) submitted for various analyses or the number of samples currently on hold for potential future analyses.
2. Baseline monitoring activities are summarized in Section 2.1 of Appendix A. Sampling locations are depicted in Figures A-1, A-5, and A-8.
3. The number of locations represents the total number of cores collected. The number of samples reflects the number of composite samples and/or the total number of sample intervals obtained from the cores.
4. During-construction monitoring activities are summarized in Section 2.2 of Appendix A. Sampling locations are depicted in Figures A-15, A-19, and A-20. Noise and turbidity monitoring were also conducted with real-time measurements recorded.
5. The number of samples includes the number of composite samples analyzed, but does not include the number of grab samples collected to create each composite sample.

ACPS = Activated Carbon Pilot Study
BC-C = black carbon - chemical pre-oxidation analytical method
BC-T = black carbon - chemothermal pre-combustion analytical method
PCB = polychlorinated biphenyl
POC = particulate organic carbon
QA/QC = quality assurance/quality control
TOC = total organic carbon
TSS = total suspended solids

Table A-2
Baseline Benthic Invertebrate Community Studies - Benthic Taxa and Species Counts

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

			Area	Mixed Tiller Treatment Area						Tine Sled Mixed and Unmixed Tiller Treatment Areas			Back-ground
			Collection Date	8/24/06						8/24/06			8/24/06
			Sample Location	M1	M2	M3	M4	M5	M6	U1	U2	U3	BG1
Invertebrate Species	**Tolerance Value**	**Feeding Guild**	**Organism Habitat**	**Number of Organisms**									
INSECTA													
EPHEMEROPTERA													
Hexagenia limbata	6	Gatherer	Burrower	1		1						1	
COLEOPTERA													
Dubiraphia sp.	6	Gatherer	Clinger			1	3				1	2	1
TRICHOPTERA													
Phylocentropus sp.	5	Filterer	Burrower	1									
DIPTERA													
Ablabesmyia annulata	8	Predator	Sprawler	1								1	
Ablabesmyia sp.	8	Predator	Sprawler	1									
Chironomus sp.	10	Gatherer	Burrower			2	6		1	1		1	
Cladopelma sp.	9	Gatherer	Burrower				1	1					1
Cladotanytarsus sp.	5	Filterer	Climber				1		1				
Clinotanypus sp.	8	Predator	Burrower				1	1	1	1	2	1	2
Coelotanypus sp.	4	Predator	Burrower	3		1			1		1	2	1
Cryptochironomus sp.	8	Predator	Sprawler	2	1						1		
Dicrotendipes sp.	8	Gatherer	Burrower				1						
Epoicocladius sp.	4	Gatherer	NA									1	
Eukiefferiella sp.	8	Gatherer	Sprawler							1			
Micropsectra sp.	7	Filterer	Climber				2					1	
Orthocladius/Cricotopus gr.	6.5	Gatherer	Sprawler				1						
Probezzia sp.	6	Predator	Burrower				1		1			1	
Procladius sp.	9	Predator	Sprawler	3	2		4	5	3	1	2		2
Tanypus sp.	10	Predator	Sprawler		2			1		1			2
CRUSTACEA													
ISOPODA													
Caecidotea sp.	8	Gatherer	Sprawler		1		4						
AMPHIPODA													
Gammarus sp.	6	Gatherer	Swimmer	1									1
ANNELIDA													
OLIGOCHAETA													
Limnodrilus hoffmeisteri	10	Gatherer	Burrower		3	1	2	3	3	1		1	3
Spirosperma ferox	6	Gatherer	Burrower				1						
Unid. Immature Tubificidae w/ Capilliform Chaetae	10	Gatherer	Burrower	1		1		1			1		
Unid. Immature Tubificidae w/o Capilliform Chaetae	10	Gatherer	Burrower	4	3	4	4	4	4	1	3	3	2
MOLLUSCA													
GASTROPODA													
Physidae	8	Gatherer	Clinger				1						
Unidentified Gastropoda	7	Scraper	Clinger										1
Valvata sp.	8	Scraper	Clinger	1	1								
PELECYPODA													
Pisidium sp.	6	Filterer	Burrower		3		5		1		2		2
Sphaeriidae	6	Filterer	Burrower							1			
Total Organisms				19	16	11	38	16	16	8	13	15	18
Total mass (milligram/sample)				191.89	53.69	19.81	47.19	16.46	11.17	4.15	6.9	81.75	28.19

Notes:

1. Locations are shown on Figure A-5.
2. Tolerance Value designations are from NYSDEC Work Plan for Biological Stream Monitoring (NYSDEC, June 2002) and/or USEPA Rapid Bioassessment Protocols (USEPA, July 1999).
3. Feeding Guild and Organism Habit designations are from NYSDEC Work Plan for Biological Stream Monitoring (NYSDEC, June 2002), Aquatic Insects of North America (Merritt and Cummins, 1996), Ecology and Classification of North American Freshwater Invertebrates (Thorp and Covich, 2001), and Feeding of Freshwater Invertebrates (Monakov, June 2003).

NA = not available/applicable

Table A-3
Baseline Benthic Invertebrate Community Studies - Percent Benthic Abundance by Order

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

	Area	Mixed Tiller Treatment Area							Tine Sled Mixed and Unmixed Tiller Treatment Areas				Back-ground
	Collection Date	8/24/06							8/24/06				8/24/06
	Sample Location	M1	M2	M3	M4	M5	M6	Mean	U1	U2	U3	Mean	BG1
Percent Abundance (Order Taxa)	Ephemeroptera	5	0	9	0	0	0	2	0	0	7	2	0
	Coleoptera	0	0	9	8	0	0	3	0	8	13	7	6
	Trichoptera	5	0	0	0	0	0	1	0	0	0	0	0
	Diptera	53	31	27	47	50	50	43	63	46	53	54	44
	Isopoda	0	6	0	11	0	0	3	0	0	0	0	0
	Amphipoda	5	0	0	0	0	0	1	0	0	0	0	6
	Oligochaeta	26	38	55	18	50	44	38	25	31	27	27	28
	Gastropoda	5	6	0	3	0	0	2	0	0	0	0	6
	Pelecypoda	0	19	0	13	0	6	6	13	15	0	9	11

Notes:
1. Locations are shown on Figure A-5.
2. Percentages may not add exactly to 100% due to rounding.

Table A-4
Baseline Benthic Invertebrate Community Studies - Benthic Metrics

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

		Area	Mixed Tiller Treatment Area							Tine Sled Mixed and Unmixed Tiller Treatment Areas				Back-ground
		Collection Date	8/24/06							8/24/06				8/24/06
		Sample Location	M1	M2	M3	M4	M5	M6	Mean	U1	U2	U3	Mean	BG1
Benthic Metrics	Abundance	Total Organisms	19	16	11	38	16	16	19	8	13	15	12	18
		Biomass (mg/sample)	191.89	53.69	19.81	47.19	16.46	11.17	57	4.15	6.9	81.75	31	28.19
	Richness	Number of Taxa	11	8	7	16	7	9	10	8	8	11	9	11
		Diversity Index	3.2	2.9	2.6	3.7	2.5	2.9	2.9	3.0	2.9	3.3	3.1	3.4
	Tolerance	Tolerance Index	7.7	8.8	8.7	8.1	9.5	8.5	8.5	8.9	8.0	7.3	8.0	8.2
	Feeding Guild	% Filterer	5	19	0	21	0	13	10	13	15	7	12	11
		% Gatherer	37	44	91	63	56	50	57	50	38	60	49	44
		% Predator	53	31	9	16	44	38	32	38	46	33	39	39
		% Scraper	5	6	0	0	0	0	2	0	0	0	0	6
	Organism Habit	% Burrower	53	56	91	58	63	75	66	63	69	67	66	61
		% Clinger	5	6	9	11	0	0	5	0	8	13	7	11
		% Sprawler	37	38	0	24	38	19	26	38	23	7	22	22
		% Climber	0	0	0	8	0	6	2	0	0	7	2	0
		% Swimmer	5	0	0	0	0	0	1	0	0	0	0	6

Notes:
1. Locations are shown on Figure A-5.
2. Percentages may not add exactly to 100% due to rounding.

mg = milligrams (wet weight)
% = percent

Table A-5
Baseline Benthic Invertebrate Community Studies - Grain Size and TOC Results

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Area	Collection Date	Sample Location	Water Depth (ft)	Grain Size (percent by mass)							TOC (%)
				Gravel		Sand			Silt	Clay	
				Coarse	Fine	Coarse	Medium	Fine			
Mixed Tiller Treatment Area	8/24/06	M1	14.5	0.0 (0.0)	0.5 (0.0)	4.1 (4.3)	22.7 (22.1)	22.3 (25.7)	48.3 (47.9)	2.1 (0.0)	6.2 (4.2)
		M2	15.5	0.0	0.0	1.7	21.0	30.0	47.3	0.0	5.7
		M3	15.5	0.0	0.6	4.2	20.8	17.4	53.5	3.5	4.9
		M4	15.6	0.0	0.6	10.5	33.6	21.1	34.2	0.0	4.0
		M5	15.3	0.0	0.3	5.8	25.3	18.9	48.2	1.5	5.2
		M6	15.7	0.0	0.2	5.0	21.2	18.7	54.7	0.2	4.3
Tine Sled Mixed and Unmixed Tiller Treatment Areas	8/24/06	U1	15.8	0.0	0.1	3.7	21.3	19.7	53.7	1.5	4.4
		U2	15.8	0.0	0.0	3.8	23.4	21.5	51.3	0.0	4.7
		U3	15.5	0.0	0.2	6.3	25.7	23.7	44.1	0.0	4.3
Background	8/24/06	BG1	15.5	0.0	0.5	5.2	21.8	23.7	48.5	0.3	4.0

Notes:
1. Locations are shown on Figure A-5.
2. Duplicate results provide in parentheses.

ft = feet
TOC = total organic carbon
% = percent

Table A-6
Baseline Qualitative Aquatic Habitat Survey - Water Quality Measurements

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Area	Collection Date	Sample Location	Total Water Depth (ft)	Measurement Interval	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Water Temperature (C)	Velocity (ft/s)
Mixed Tiller Treatment Area	8/24/06	M1	14.5	Surface	7.9	0.142	7.0	8.0	22.9	0.06
				Middle	7.9	0.142	7.3	8.1	22.9	0.04
				Bottom	7.8	0.142	6.9	8.0	22.8	0.07
Tine Sled Mixed and Unmixed Tiller Treatment Areas	8/24/06	U1	15.8	Surface	8.1	0.139	7.2	8.7	23.4	-0.08
				Middle	8.0	0.139	6.1	7.8	23.0	-0.05
				Bottom	7.8	0.139	9.3	7.0	22.9	0.02
Background	8/24/06	BG1	15.5	Surface	7.9	0.139	5.4	7.9	23.1	0.00
				Middle	7.8	0.139	4.4	7.5	22.9	-0.05
				Bottom	7.7	0.139	6.3	7.5	22.9	0.05

Notes:
1. Locations are shown on Figure A-5.
2. Water quality measurements taken within one foot of water surface, middle, and at the bottom of the water column.
3. Negative velocity readings indicate flow moving upstream; the magnitude of the velocity is accurate.

C = degrees Celsius
ft = feet
ft/s = feet per second
mg/L = milligrams per liter
NTU = Nephelometric Turbidity Unit
mS/cm = milliSiemens per centimeter

Table A-7a
Average Weight Recoveries of *Lumbriculus variegates* from In-Situ Exposures (N=6)

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Site	M1	M2	M3	M4	M5	M6	BG1	Overall (N=42)
Average %	101	90.9	75.7	86.8	75.1	77.2	101.5	86.9
± SD %	10	13.7	34.2*	12.1	11.9	10.3	6.6	18.6
Range %	82.6 – 111	76.1 – 106	16.5 – 117	75.6 – 98.6	54.4 – 86.7	59.0 – 88.9	94.5 – 109	16.5 – 117

Notes:
1. Recovery = (Wet tissue weight before exposure ÷ Wet tissue weight prior to extraction) x 100%
2. * Recovery in one exposure chamber was 16.6%; Avg ± SD with low recovery removed (N=5) was 87.6 ± 20.2%

M = Mixed Tiller Treatment Area
BG = background

Table A-7b
Average Weight Recoveries of *Lumbriculus variegates* from Ex-Situ Exposures (N=5)

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Site	M1	M2	M3	M4	M5	M6	BG1	Overall (N=35)
Average %	60.6	57.8	68.9	77.8	87.3	68.7	58.5	68.5
± SD %	15.2	2.3	9.9	25.6	16.4	9.1	17.5	17.3
Range %	45.2 – 84.9	54.5 – 60.5	55.6 – 82.5	46.3 – 108	71.0 – 110	55.2 – 79.5	37.9 – 82.0	37.9 – 110

Site	UTA 3	UTA 5	UTA 9	UTA 14	UTA 15	UTA 17	Overall (N=35)
Average %	105	149	119	113	109	127	120
± SD %	23	26	16	29	19	22	26
Range %	80.3 – 138	116 – 178	99.6 – 141	85.0 – 162	76.9 – 127	101 – 156	76.9 – 178

Notes:
1. Recovery = (Wet tissue weight before exposure ÷ Wet tissue weight prior to extraction) x 100%

BG = background
M = Mixed Tiller Treatment Area
UTA = Unmixed Tiller Treatment Area

Table A-8.
Pre-Application Results for Sediment Samples Collected September 12-14, 2006

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	0 - 3 inches TOC (%)	0 - 3 inches Bulk Density (g/cm^3)	0 - 3 inches Percent Moisture (%)	3 - 6 inches TOC (%)	3 - 6 inches Bulk Density (g/cm^3)	3 - 6 inches Percent Moisture (%)	0 - 6 inches Density-Weighted TOC (%)
Initial Testing Area - Mixed Tiller Testing								
9/14	TEST-TM-01	6.1	0.40	68.4	5.7	0.49	63.4	5.88
	TEST-TM-02	4.3	0.40	66.7	4.0	0.49	61.2	4.13
	TEST-TM-03	4.9	0.42	69.9	2.4 (6.4)	0.52 (0.51)	46.7 (62.7)	4.62
	TEST-TM-04	4.6	0.45	66.7	4.6	0.43	66.9	4.60
	TEST-TM-05	3.9	0.43	67.0	4.8	0.45	63.9	4.36
	TEST-TM-06	3.9	0.42	67.7	4.1	0.44	63.6	4.00
	TEST-TM-07	7.1	0.42	66.9	4.5	0.47	63.0	5.73
	TEST-TM-08	5.8	0.45	64.8	6.7	0.45	64.0	6.25
	TEST-TM-09	3.9	0.43	67.3	4.4	0.49	64.2	4.17
	TEST-TM-10	5.4	0.42	66.4	4.6	0.46	59.2	4.98
	TEST-TM-11	5.9	0.37	66.7	6.7	0.49	69.2	6.36
	TEST-TM-12	5.7	0.41	66.4	6.1	0.51	61.7	5.92
	TEST-TM-13	5.6	0.45	65.6	6.2	0.47	65.4	5.91
	TEST-TM-14	5.4	0.49	62.4	6.4	0.43	64.3	5.87
	TEST-TM-15	5.8	0.44	66.8	5.7	0.49	61.9	5.75
	TEST-TM-16	5.0	0.55	58.5	5.1	0.53	58.8	5.05
Initial Testing Area - Unmixed Tiller Testing								
9/14	TEST-TU-01	4.7 (5.0)	0.49 (0.49)	62.2 (61.6)	N/A	N/A	N/A	---
	TEST-TU-02	5.9	0.42	67.9	N/A	N/A	N/A	---
	TEST-TU-03	5.9	0.47	62.2	N/A	N/A	N/A	---
	TEST-TU-04	6.0	0.46	65.0	N/A	N/A	N/A	---
	TEST-TU-05	6.6	0.43	67.2	N/A	N/A	N/A	---
	TEST-TU-06	4.8	0.55	62.6	N/A	N/A	N/A	---
Initial Testing Area - Tine Sled Testing								
9/13	TEST-TS-01	4.5	0.36	70.8	3.6	0.51	60.9	3.97
	TEST-TS-02	6.3	0.43	69.4	5.9	0.35	61.7	6.12
	TEST-TS-03	5.8	0.38	71.2	2.9	0.50	61.1	4.15
	TEST-TS-04	4.1	0.36	70.4	2.2	0.47	64.4	3.02
	TEST-TS-05	6.2	0.45	67.8	6.1	0.38	66.5	6.15
	TEST-TS-06	3.5	0.38	70.3	5.5 (6.1)	0.48 (0.49)	65.5 (64.7)	4.79
	TEST-TS-07	4.5	0.43	68.5	6.2	0.39	71.3	5.31
	TEST-TS-08	6.2	0.46	68.1	4.9	0.43	62.6	5.57
	TEST-TS-09	4.1	0.36	71.7	4.2	0.48	63.1	4.16
	TEST-TS-10	5.4	0.38	73.7	5.1	0.41	60.7	5.24
	TEST-TS-11	6.2 (7.3)	0.41 (0.57)	69.1 (68.8)	5.1	0.38	65.3	6.03
	TEST-TS-12	3.9	0.42	64.6	3.8	0.51	60.1	3.85
	TEST-TS-13	4.7	0.48	68.3	5.0	0.35	63.8	4.83
	TEST-TS-14	6.5	0.41	68.0	5.2	0.49	61.2	5.79
	TEST-TS-15	4.2	0.42	69.8	4.2	0.45	63.1	4.20
	TEST-TS-16	5.5	0.39	67.9	5.3	0.35	65.3	5.41
Initial Testing Area - Accepted Method								
9/13	TEST-AM-01	6.6	0.31	69.8	7.5	0.51	65.4	7.16
	TEST-AM-02	7.8	0.37	70.2	7.3	0.41	69.3	7.54
	TEST-AM-03	2.9	0.36	70.2	4.9	0.34	70.1	3.87
	TEST-AM-04	7.2	0.35	70.7	5.7	0.36	69.0	6.44
	TEST-AM-05	6.3	0.40	66.3	6.3	0.37	64.9	6.30
	TEST-AM-06	4.0	0.37	71.9	4.9	0.38	69.1	4.46
	TEST-AM-07	5.8	0.35	72.4	5.9	0.34	69.8	5.85
	TEST-AM-08	7.1	0.35	71.3	6.5	0.47	64.3	6.76
	TEST-AM-09	4.7	0.35	69.4	5.7	0.45	64.9	5.26
	TEST-AM-10	6.4	0.44	69.5	8.0	0.45	69.5	7.21
	TEST-AM-11	5.8	0.40	67.4	4.5	0.53	61.9	5.06
	TEST-AM-12	6.3	0.31	72.0	6.6	0.31	77.5	6.45
	TEST-AM-13	6.1	0.39	65.2	6.0	0.45	64.4	6.05
	TEST-AM-14	5.1	0.38	70.1	3.5	0.46	65.9	4.22
	TEST-AM-15	3.2	0.37	68.0	5.9	0.44	64.1	4.67
	TEST-AM-16	8.2 (5.7)	0.42 (0.49)	68.6 (66.1)	6.9	0.37	69.7	6.93

(*continued*)

Table A-8.
Pre-Application Results for Sediment Samples Collected September 12-14, 2006

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	0 - 3 inches TOC (%)	0 - 3 inches Bulk Density (g/cm^3)	0 - 3 inches Percent Moisture (%)	3 - 6 inches TOC (%)	3 - 6 inches Bulk Density (g/cm^3)	3 - 6 inches Percent Moisture (%)	0 - 6 inches Density-Weighted TOC (%)
Mixed Tiller Treatment Area								
9/12	MTA-01	6.4	0.40	68.2	4.2	0.47	63.2	5.21
	MTA-02	6.1	0.42	65.3	5.4	0.51	62.2	5.72
	MTA-03	4.1	0.42	69.6	5.6	0.50	64.1	4.92
	MTA-04	5.6	0.37	70.0	4.2	0.39	66.5	4.88
	MTA-05	5.0	0.46	64.9	6.4	0.47	62.6	5.71
	MTA-06	4.1	0.49	65.7	4.4	0.49	63.3	4.25
	MTA-07	6.1	0.35	71.4	3.8	0.43	63.2	4.83
	MTA-08	7.1	0.41	66.8	6.6	0.43	65.4	6.84
	MTA-09	4.3	0.53	61.0	4.1	0.41	68.5	4.21
	MTA-10	5.1	0.36	69.7	4.7	0.45	65.9	4.88
	MTA-11	5.8	0.42	64.7	6.7	0.42	66.1	6.25
	MTA-12	4.7	0.43	67.2	5.6	0.45	64.9	5.16
	MTA-13	5.4	0.38	67.2	5.6	0.45	64.2	5.51
	MTA-14	7.0	0.40	68.3	6.5	0.48	65.6	6.73
	MTA-15	5.5 (5.4)	0.38 (0.38)	68.5 (69.7)	6.6	0.40	66.1	6.04
	MTA-16	4.9	0.43	62.9	5.2	0.41	68.1	5.05
Tine Sled Mixed/Unmixed Tiller Treatment Areas [3]								
9/12	UTA-01	7.4 (7.0)	0.39 (0.39)	67.8 (69.7)	N/A	N/A	N/A	---
	UTA-02	6.5	0.46	66.2	N/A	N/A	N/A	---
	UTA-03	5.4	0.36	70.3	N/A	N/A	N/A	---
	UTA-04	5.7	0.33	70.9	N/A	N/A	N/A	---
	UTA-05	6.4	0.37	69.2	N/A	N/A	N/A	---
	UTA-06	4.4	0.39	68.7	N/A	N/A	N/A	---
	UTA-07	3.1	0.43	66.4	N/A	N/A	N/A	---
	UTA-08	6.8	0.36	68.7	N/A	N/A	N/A	---
	UTA-09	5.1	0.41	68.0	N/A	N/A	N/A	---
	UTA-10	5.4	0.34	67.6	N/A	N/A	N/A	---
	UTA-11	6.0	0.44	66.3	N/A	N/A	N/A	---
	UTA-12	4.5	0.40	65.6	N/A	N/A	N/A	---
	UTA-13	4.3	0.39	67.2	N/A	N/A	N/A	---
	UTA-14	7.3	0.39	70.0	N/A	N/A	N/A	---
	UTA-15	5.4 (5.4)	0.37 (0.34)	69.7 (69.9)	N/A	N/A	N/A	---
	UTA-16	4.3	0.38	67.9	N/A	N/A	N/A	---

Notes:
1. Duplicate values are shown in parentheses.
2. 'N/A' = Not Available; '---' = Not Calculated.
3. Cores collected from:
   'UTA-01' through 'UTA-10': Tine Sled Mixed Treatment Area
   'UTA-11' and 'UTA-12': buffer zone between the Tine Sled Mixed and Unmixed Tiller Treatment Areas
   'UTA-13' through 'UTA-16': Unmixed Tiller Treatment Area

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
(g/cm^3) = grams per cubic centimeter

Table A-9.

Average Dry Bulk Density and Percent Moisture Levels in Surface Sediments for Each ACPS Area – Pre-Application Monitoring

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

ACPS Area	Average (Range)	
	Dry Bulk Density (g/cm^3)	Percent Moisture (%)
Initial Testing Area	0.41 (0.31 - 0.55)	67.9 (58.5 - 73.7)
Mixed Tiller Treatment Area	0.41 (0.35 - 0.53)	67.0 (61.0 - 71.4)
Tine Sled Mixed Treatment Area	0.38 (0.33 - 0.46)	68.5 (66.2 - 70.9)
Unmixed Tiller Treatment Area	0.38 (0.36 - 0.39)	68.7 (67.2 - 70.0)

Notes:
1. Based on samples collected during the September 12-14, 2006 baseline survey.

ACPS = Activated Carbon Pilot Study
(g/cm^3) = grams per cubic centimeter

Table A-10
Pre-Application Results for Sediment Samples Collected August 8, 2006

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Pre-Application Black Carbon (BC-C) (%)	Work Area
8/8/2006	M1	0.0 - 1.5	0.07	Mixed Tiller Treatment Area
		1.5 - 3.0	0.14	
		3.0 - 4.5	0.10	
		4.5 - 6.0	0.11	
	M2	0.0 - 1.5	0.07	
		1.5 - 3.0	0.15	
		3.0 - 4.5	0.08	
		4.5 - 6.0	0.16	
	M3	0.0 - 1.5	0.04	
		1.5 - 3.0	0.09	
		3.0 - 4.5	0.07	
		4.5 - 6.0	0.08	
	M4	0.0 - 1.5	0.02	
		1.5 - 3.0	0.09	
		3.0 - 4.5	0.07	
		4.5 - 6.0	0.12	
	M5	0.0 - 1.5	0.05	
		1.5 - 3.0	0.08	
		3.0 - 4.5	0.09	
		4.5 - 6.0	0.11	
	M6	0.0 - 1.5	0.05	
		1.5 - 3.0	0.10	
		3.0 - 4.5	0.14	
		4.5 - 6.0	0.15	
	U1	0.0 - 1.5	0.12	Tine Sled Unmixed Treatment Area
		1.5 - 3.0	0.26	
		3.0 - 4.5	0.08	
		4.5 - 6.0	0.08	
	U2	0.0 - 1.5	0.14	
		1.5 - 3.0	0.09	
		3.0 - 4.5	0.08	
		4.5 - 6.0	0.08	
	U3	0.0 - 1.5	0.16	Unmixed Tiller Treatment Area
		1.5 - 3.0	0.12	
		3.0 - 4.5	0.07	
		4.5 - 6.0	0.08	

Notes:
1. Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C).
2. Three samples identified as duplicates were analyzed for BC-C:

M2 (6-9 in): 0.13%
M3 (9-12 in): 0.14%
M4 (6-9 in): 0.14%

Table A-11

During-Application Water Column Sample Summary [1]

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date	Construction Activity at the Time of Sampling	Number of Samples Collected at Routine Locations [2]					Comments
		Transect [3,4,6]		Local [3,5,6]			
		WCT43	WCT46	ACPS-1	ACPS-2	ACPS-3	
9/20/2006	Silt Curtain Installation	1	1	--	--	--	
9/21/2006	Silt Curtain Installation	1	1	--	--	--	
9/22/2006	Silt Curtain Installation	1	1	--	--	--	
9/23/2006	--	--	--	--	--	--	No construction - weekend
9/24/2006	--	--	--	--	--	--	No construction - weekend
9/25/2006	Initial Testing Area	1	1	1	1	1	Additional continuous turbidity monitoring conducted
9/26/2006	Initial Testing Area	1	1	1	1	1	Additional continuous turbidity monitoring conducted
9/27/2006	Initial Testing Area	1	1	1	1	1	
9/28/2006	Initial Testing Area	1	1	1	1	1	
9/29/2006	Initial Testing Area	1	1	1	1	1	Additional continuous turbidity monitoring conducted
9/30/2006	--	--	--	--	--	--	No construction - weekend
10/1/2006	--	--	--	--	--	--	No construction - weekend
10/2/2006	Initial Testing Area	1	1	1	1	1	
10/3/2006	Mixed Tiller Treatment	1	1	1	1	1	
10/4/2006	Mixed Tiller Treatment	1	1	1	1	1	
10/5/2006	Mixed Tiller Treatment	1	1	1	1	1	
10/6/2006	Mixed Tiller Treatment	1	1	1	1	1	
10/7/2006	--	--	--	--	--	--	No construction - weekend
10/8/2006	--	--	--	--	--	--	No construction - weekend
10/9/2006	Mixed Tiller Treatment	1	1	1	1	1	Supplemental water column samples collected at routine locations for POC analysis and immediately upstream/downstream of the tiller and within the tiller vent for TSS and POC analysis
10/10/2006	Mixed Tiller Treatment	1	1	1	1	1	
10/11/2006	Unmixed Tiller Treatment	1	1	1	1	1	
10/12/2006	Unmixed Tiller and Tine Sled Mixed Treatment	1	1	1	1	1	
10/13/2006	Tine Sled Mixed Treatment	1	1	1	1	1	
10/14/2006	Silt Curtain Removal and Demobilization	1	1	--	--	--	
10/15/2006	--	1	1	--	--	--	No construction - Sunday
10/16/2006	Silt Curtain Removal and Demobilization	1	1	--	--	--	

Notes:

1. Table provides all water column sampling conducted during ACPS construction activities (i.e., does not include baseline and post-construction events).
2. All samples submitted to the Alcoa Massena ChemLab for TSS and PCB (Aroclor) analyses unless otherwise indicated.
3. Sample locations provided on Figure A-14.
4. Samples collected at transects were composite samples composed of 9 grab samples obtained from 3 locations (north, center, south) at 3 depths (0.2, 0.5, and 0.8 times the total water column depth). Stratification was checked at the center sampling station. Turbidity, dissolved oxygen, temperature, pH, and conductivity were obtained at each sampling depth at the center channel location. Turbidity only was also obtained at WCT46 at the north shore location.
5. Samples at the local locations were composite samples of 3 grab samples (0.2, 0.5, and 0.8 times the total water column depth). Stratification was checked at each location. Turbidity, dissolved oxygen, temperature, pH and conductivity measurements were obtained at each sampling depth at each location.
6. Number of samples presented on the table does not include field or laboratory quality assurance/quality control samples.

ACPS = Activated Carbon Pilot Study
PCB = polychlorinated biphenyl
POC = particulate organic carbon
TSS = total suspended solids

Table A-12.
2006 ACPS Water Column Monitoring Results

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Application	Daily Average Flow (cfs)[4]	Total Suspended Solids (mg/L)					Turbidity (NTU)				
			WCT43	ACPS-1	ACPS-2	ACPS-3[3]	WCT46	WCT43	ACPS-1	ACPS-2	ACPS-3[3]	WCT46
9/20	Silt Curtain Installation	216.5	ND (3.60)	---	---	---	2.8	2.3	---	---	---	2.4
9/21		207.6	2.00	---	---	---	2.4	2.7	---	---	---	2.9
9/22		224.7	2.40	---	---	---	1.6	2.8	---	---	---	2.5
9/25	Initial Testing- Mixed Tiller	248.0	ND	3.6	4	4	4.4	2.9	3.7	4.1	4.1	3.6
9/26	Initial Testing- Mixed/Unmixed Tiller	312.4	ND	3.6	3.2	4.4	2.8 (3.2)	2.8	3.8	3.5	3.4	3.3
9/27	Initial Testing- Tine Sled	367.0	1.60	2.8	ND	2.4	2.8	2.9	3.1	3.5	2.7	2.9
9/28		358.1	ND	1.6	2	2	2	2.8	3.0	3.0	2.9	3.0
9/29	Initial Testing- Mixed Tiller	527.5	2.00	1.6	3.6	2.4	3.2	0.4	1.0	0.8	0.9	0.5
10/2		932.1	ND	ND	ND	ND	ND (1.6)	0.3	0.6	0.5	0.5	0.4
10/3	Mixed Tiller Application	734.6	ND	2	ND	ND	2	0.4	0.7	1.3	1.2	0.6
10/4		589.4	ND	1.6	2	1.6	2.4	0.4	0.6	0.6	0.9	0.4
10/5		547.9	1.60	2.8	2.4	2.4	ND	1.1	1.1	1.2	1.4	1.3
10/6		779.9	3.20	2.4	2.4	2.4	3.2 (1.6)	1.3	1.5	1.4	1.3	1.1
10/9		470.7	ND	2.8	3.2	4.4	1.6	0.9	1.3	1.6	1.2	1.0
10/10		393.9	ND	2.4	2	2	2	1.1	1.5	1.8	1.9	1.4
10/11	Unmixed Tiller Application	361.9	ND	ND	1.6	2	1.6	1.3	1.3	1.5	1.5	1.5
10/12	Unmixed Tiller and Tine Sled Application	344.8	2.40	2	2	5.2	4.4 (2.0)	0.9	1.1	1.5	2.1	1.3
10/13	Tine Sled Application	316.8	1.60	1.6	5.2	4	ND	2.0	1.8	2.3	2.2	2.0
10/14	Silt Curtain Removal and Demobilization	364.2	3.60	---	---	---	3.6	1.7	---	---	---	2.1
10/16		415.2	2.40	---	---	---	3.2	1.5	---	---	---	1.9

Notes:
1. Duplicate values are shown in parentheses.
2. 'ND' = Non-Detect; '---' = Not Sampled.
3. Local station 'ACPS-3' is located inside the silt curtain.
4. Daily average flow based on data from USGS gage at Chase Mills.
5. PCB results are not presented; levels remained below detection at all locations throughout the ACPS.

ACPS = Activated Carbon Pilot Study
cfs = cubic feet per second
mg/L = milligrams per liter
NTU = nephelometric turbidity units

Table A-13.
2006 ACPS Supplemental Continuous Turbidity Monitoring Results

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date	Time	Location	Water Depth: Total Depth (ft)	Water Depth: Reading Depth (ft)	Turbidity (NTU)	Activity
9/25/06	11:18	Upstream portion of the initial testing area in the mixed tiller treatment sub-area; corner closest to north shore	15.2	3.0	3.3	Baseline readings
9/25/06				7.6	3.4	Baseline readings
9/25/06				12.2	3.3	Baseline readings
9/25/06	11:42	Just upstream of mixed tiller application sub-area (TU1-N1) at the northwest corner of the initial testing area; readings obtained ~ 20 ft upstream of tiller	15.2	12.2	3.3	Tiller at water surface
9/25/06	11:48				5.3	Water flush through tiller
9/25/06	11:49				5.3	Water flush through tiller
9/25/06	11:51				4.8	Water flush through tiller; tiller lowered into water ~10 ft
9/25/06	11:53				3.9	Tiller raised through water to surface
9/25/06	11:56				3.4	Tiller lowered into water ~10 ft; between 11:53 and 11:56, tiller moved to adjust angle
9/25/06	11:57				3.4	Tiller in water ~0.5 ft above sediment
9/25/06	11:58				3.5	Tiller in water ~0.5 ft above sediment
9/25/06	11:59				3.6	Tiller in water ~0.5 ft above sediment
9/25/06	12:00				4.0	Tiller in water on sediment
9/25/06	12:02				23.0	Tiller in water and being adjusted near sediment
9/25/06	12:03				5.0	Tiller in water and being adjusted near sediment
9/25/06	12:05				3.6	Tiller in water and moved back on sediment
9/25/06	12:06				3.4	Tiller in water on sediment
9/25/06	12:07				3.6	Tiller in water on sediment; adjusting height to be at top of sediment
9/25/06	12:08				3.6	Tiller in position
9/25/06	12:14				9.4	Tiller in position
9/25/06	12:15				6.0	Tiller in position
9/25/06	12:16				7.5	Tiller in position
9/25/06	12:18				5.9	Tiller in position
9/25/06	12:26				3.3	Mixing with tiller and water application only (t=0 seconds)
9/25/06	12:26				3.2	Mixing with tiller and water application only (t=30 seconds)
9/25/06	12:26				3.1	Mixing with tiller and water application only (t=55 seconds)
9/25/06	12:29				3.3	Mixing with tiller and water and carbon application (t=0 seconds)
9/25/06	12:29				3.2	Mixing with tiller and water and carbon application (t=30 seconds)
9/25/06	12:30				3.2	Mixing with tiller and water and carbon application (t=60 seconds)
9/25/06	12:30				3.2	Mixing with tiller and water and carbon application (t=90 seconds)
9/25/06	12:31				3.3	Mixing with tiller and water and carbon application (t=120 seconds)
9/25/06	12:31				3.3	Mixing with tiller discontinued (t=150 seconds)
9/25/06	12:32				3.3	No mixing (t=180 seconds)
9/25/06	12:32				3.4	No mixing (t=210 seconds)
9/25/06	12:34				3.3	No mixing
9/25/06	12:36				3.4	No mixing
9/25/06	12:42	In mixed tiller application sub-area (TU1-N2) at the northwest corner of the initial testing area; readings obtained adjacent to video camera between marine plant and tiller and downstream of tiller/shroud	Not recorded	Not recorded, but at 0.8 x total water column depth	3.2	No mixing; wait time for settling
9/25/06	12:45				3.1	No mixing; wait time for settling
9/25/06	12:46				3.3	Carbon and water pumped through tiller; no mixing
9/25/06	12:48				3.2	Carbon and water pumped through tiller; no mixing
9/25/06	12:49				3.4	No mixing
9/25/06	12:55				3.3	No mixing
9/25/06	12:56				3.3	Tiller raised from sediment to water surface (t=0 seconds)
9/25/06	12:56				4.3	Tiller raised from sediment to water surface (t=30 seconds)
9/25/06	12:57				3.4	Tiller raised from sediment to water surface (t=60 seconds)
9/25/06	12:57				3.2	Tiller raised from sediment to water surface (t=75 seconds)
9/25/06	12:57				3.4	Tiller raised from sediment to water surface (t=90 seconds)
9/25/06	13:21	In mixed treatment sub-area within the initial testing area; just downstream of marine plant; downstream of tiller	16.0	12.8	3.4	Mixing with tiller
9/25/06	13:22				3.3	No mixing; wait time for settling
9/25/06	13:24				3.4	No mixing; wait time for settling
9/25/06	13:26				3.2	No mixing; wait time for settling
9/25/06	13:27				3.4	No mixing; wait time for settling
9/25/06	13:28				3.2	Tiller raised from sediment to water surface
9/25/06	13:29				3.4	Tiller raised from sediment to water surface
9/25/06	13:30				3.4	Tiller raised from sediment to water surface
9/25/06	13:31				3.3	Tiller raised from sediment to water surface
9/25/06	13:32				3.1	Tiller raised from sediment to water surface
9/25/06	13:33				3.4	Tiller raised to water surface; movement to next application location
9/25/06	13:34				3.3	Tiller raised to water surface; movement to next application location
9/25/06	13:38				3.3	Mixing with tiller
9/25/06	13:40				3.7	Mixing with tiller
9/25/06	13:41				4.5	Mixing with tiller
9/25/06	13:42				4.5	Mixing with tiller
9/25/06	13:43				8.1	Mixing with tiller
9/25/06	13:44				7.0	No mixing; wait time for settling
9/25/06	13:45				4.5	No mixing; wait time for settling
9/25/06	13:46				4.1	No mixing; wait time for settling
9/25/06	13:47				9.5	No mixing; wait time for settling
9/25/06	13:48				5.6	No mixing; wait time for settling
9/25/06	13:49				7.4	Tiller raised from sediment to water surface
9/25/06	13:50				8.0	Tiller raised from sediment to water surface
9/25/06	13:51				5.7	Tiller raised from sediment to water surface
9/25/06	13:52				6.8	Tiller raised to water surface; tiller movement to allow sediment sampling
9/25/06	13:53				6.6	Tiller raised to water surface; tiller movement to allow sediment sampling
9/25/06	13:54				6.2	Tiller raised to water surface; tiller movement to allow sediment sampling
9/25/06	13:55				4.5	Tiller raised to water surface; tiller movement to allow sediment sampling
9/25/06	13:56				3.6	Tiller raised to water surface; tiller movement to allow sediment sampling
9/25/06	14:00				4.1	Tiller raised to water surface; tiller movement to allow sediment sampling

(continued)

Table A-13.
2006 ACPS Supplemental Continuous Turbidity Monitoring Results

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date	Time	Location	Water Depth Total Depth (ft)	Water Depth Reading Depth (ft)	Turbidity (NTU)	Activity
9/26/06	11:16	In tine sled treatment sub-area within the initial testing area; just downstream of marine plant; downstream of tine sled	15.0	12.0	3.0	Tine sled application prep
9/26/06	11:18				3.2	Tine sled application prep
9/26/06	11:20				3.5	Tine sled application prep
9/26/06	11:30				3.5	Tine sled application testing; carbon/water pump and pull
9/26/06	11:31				3.2	Tine sled application testing; carbon/water pump and pull
9/26/06	11:32				3.1	Tine sled application testing; carbon/water pump and pull
9/26/06	11:33				3.3	Tine sled application testing; carbon/water pump and pull
9/26/06	11:35				3.1	Tine sled application testing; carbon/water pump and pull
9/26/06	11:37				3.4	Tine sled application testing; carbon/water pump and pull
9/26/06	11:39				3.2	Tine sled application testing; carbon/water pump and pull
9/26/06	11:44				3.5	Tine sled drag application complete
9/26/06	11:50				10.0	Relocating tine sled
9/26/06	11:52				3.0	Tine sled out of water
9/26/06	14:57				3.0	Tine sled application testing; carbon/water pump and pull
9/26/06	14:58				3.3	Tine sled application testing; carbon/water pump and pull
9/26/06	14:59				3.7	Tine sled application testing; carbon/water pump and pull - stop
9/26/06	15:00				3.8	Tine sled application testing; carbon/water pump and pull - stop
9/26/06	15:01				3.4	Tine sled application testing; carbon/water pump and pull - stop
9/26/06	15:02				3.2	Tine sled application testing; carbon/water pump and pull - stop
9/29/06	11:17	In unmixed treatment sub-area within the initia testing area; ~ 10 ft downstream of tiller	15.0	14.0	1.5	Tiller ~ 1.5' from sediment
9/29/06	11:24				1.3	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:24				1.6	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:24				1.7	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:24				1.6	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:25				1.7	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:25				1.8	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:25				1.8	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:25				1.9	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:26				2.2	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:26				2.1	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:26				1.9	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:26				1.6	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:27				1.2	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:27				1.3	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	11:27				0.4	Tiller ~ 1.5' from sediment; carbon application (no mixing)
9/29/06	12:07				0.6	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:10				0.5	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:10				0.8	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:10				1.2	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:10				1.4	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:11				1.1	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:11				1.3	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:11				1.2	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:11				1.4	Tiller ~ 1.5' from sediment; carbon application and mixing
9/29/06	12:12				1.6	Tiller ~ 1.5' from sediment; no application or mixing
9/29/06	12:13				1.1	No mixing; wait time for settling
9/29/06	12:14				1.3	No mixing; wait time for settling
9/29/06	12:15				1.4	No mixing; wait time for settling
9/29/06	12:16				1.4	No mixing; wait time for settling
9/29/06	12:17				1.2	Tiller raised from sediment to water surface
9/29/06	12:18				1.7	Tiller raised from sediment to water surface
9/29/06	12:19				1.9	Tiller raised from sediment to water surface
9/29/06	12:20				2.0	Tiller raised from sediment to water surface
9/29/06	12:21				1.6	Tiller at water surface

Notes:
ACPS = Activated Carbon Pilot Study
ft = feet
NTU = nephelometric turbidity units

Table A-14.
2006 ACPS Supplemental Water Column Monitoring Results

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Daily Average Flow (cfs)[2]	Particulate Organic Carbon (mg/L)	Total Suspended Solids (mg/L)
10/9	WCT43	470.7	0.279	---
	MTA-1		0.288	---
	MTA-2		0.395	---
	MTA-3		0.316	---
	WCT46		0.219	---
10/10	MAU1-N7-U1	393.9	0.384	2.00
	MAU1-N7-D1		0.542	3.60
	MAU1-N7-U2		0.501	3.60
	MAU1-N7-D2		0.493	2.40
	MAU1-N8-VENT		0.411	3.60

Notes:
1. '---' = Not Sampled.
2. Daily average flow based on data from USGS gage at Chase Mills.

ACPS = Activated Carbon Pilot Study
cfs = cubic feet per second
mg/L = milligrams per liter

Table A-15
Summary of Collected Cores and Archived Samples

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Treatment Area	Number of Sediment Cores Collected		Archived Samples (Not Yet Analyzed)
	Single-Point	5-Point Composite	
Initial Testing Area	60	---	6-12” sample intervals: TEST-AM-2, 2A-D, 3, 5, 6, 17-20 archived for potential TOC, percent moisture, bulk density, and black carbon analyses
Mixed Tiller	39	10	6-12” sample intervals: MTA-1, 2, 3, 6, 8-15, 17A-D, 18, 18A-D, 19, 21-25, 28, and 30 archived for potential TOC, percent moisture, and bulk density analyses
			6-12” sample intervals: MTA-1, 2, 3, 3A, 6-16, and 20 archived for potential black carbon analysis
Tine Sled Mixed	9	9	0-3”, 3-6”, and 6-12” sample intervals: TSUTA-1-9 archived for potential black carbon analysis
Unmixed Tiller	8	8	0-3” and 3-6” sample intervals: UTA-13-20 archived for potential black carbon analysis

Table A-16
During-Construction Sediment Results for the Initial Testing Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm3)	Percent Moisture (%)	Application Description
Mixed Tiller Testing						
9/26	TEST-TM-01	0 - 3	7.8	0.40	67.9	Single Dose; 0.2 ft below sediment surface
		3 - 6	7.0	0.45	65.7	
9/26	TEST-TM-02	0 - 3	7.1	0.39	69.5	
		3 - 6	7.4	0.43	66.1	
9/28	TEST-TM-02	0 - 6	5.50 (4.50)	0.43 (0.43)	66.5	
		6 - 12	6.6	0.44	64.1	
		12 - 18	6.2	0.51	61.4	
		18 - 24	8.8	0.45	64.2	
9/26	TEST-TM-03	0 - 3	6.3	0.43	66.6	
		3 - 6	6.9	0.43	64.2	
9/26	TEST-TM-04	0 - 3	6.20 (5.20)	0.43 (0.40)	67.3 (67.4)	
		3 - 6	5.8	0.49	62.4	
9/26	TEST-TM-05	0 - 3	6.9	0.39	68.1	
		3 - 6	7.2	0.43	64.1	
9/26	TEST-TM-06	0 - 3	6.3	0.43	70.3	
		3 - 6	5.5	0.56	59.7	
9/26	TEST-TM-07	0 - 3	5.4	0.44	66.7	
		3 - 6	6.1	0.46	65.0	
9/26	TEST-TM-08	0 - 3	6.0	0.39	69.5	Double Dose; 0.2 ft below sediment surface
		3 - 6	3.7	0.46	64.3	
9/26	TEST-TM-09	0 - 3	6.2	0.42	66.7	
		3 - 6	5.9	0.45	64.8	
9/28	TEST-TM-9	0 - 6	6.3	0.43	66.1	
		6 - 12	6.2	0.50	65.5	
		12 - 18	5.9	0.53	66.7	
		18 - 22	5.5	0.50	57.0	
9/26	TEST-TM-10	0 - 3	4.8	0.39	68.7	
		3 - 6	4.7	0.52	60.4	
9/29	TEST-TM-15	0 - 3	6.9	0.37	70.5	Single Dose; 0.3 ft above sediment surface
		3 - 6	4.6	0.62	56.6	
		6 - 12	5.6	0.51	62.7	
9/29	TEST-TM-16	0 - 3	7.0	0.35	67.1	
		3 - 6	4.6	0.61	57.3	
		6 - 12	5.2	0.51	60.0	
9/29	TEST-TM-17	0 - 3	8.4	0.39	69.1	Double Dose; 0.3 ft above sediment surface
		3 - 6	5.2	0.62	58.7	
		6 - 12	5.6	0.57	60.1	
9/29	TEST-TM-18	0 - 3	5.70 (6.00)	0.41 (0.38)	68.0 (68.9)	
		3 - 6	4.8	0.54	58.2	
		6 - 12	5.5	0.49	61.4	
9/29	TEST-TM-19	0 - 3	7.0	0.38	70.2	Single Dose; 0.3 ft above sediment surface
		3 - 6	5.5	0.46	63.8	
		6 - 12	5.8	0.53	61.3	
10/2	TEST-TM-20	0 - 3	4.7	0.47	64.3	Double Dose; 0.3 ft above sediment surface
		3 - 6	2.4	0.81	49.0	
		6 - 12	4.4	0.57	58.8	

(continued)

Table A-16
During-Construction Sediment Results for the Initial Testing Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm3)	Percent Moisture (%)	Application Description
Unmixed Tiller Testing						
9/26	TEST-TU-11[3]	0 - 3	5.4 (5.9)	0.35 (0.36)	69.7 (69.6)	Double Dose; 0.2 ft below sediment surface
9/28	TEST-TU-11[3]	0 - 6	6.5	0.40	66.9	
		6 - 12	18.0	0.47	69.5	
		12 - 18	5.4	0.47	61.8	
		18 - 19	6.3	0.41	59.6	
9/26	TEST-TU-12[3]	0 - 3	4.9	0.41	68.5	Single Dose; 0.2 ft below sediment surface
9/26	TEST-TU-13[3]	0 - 3	4.5	0.35	69.6	
9/29	TEST-TU-14[3]	0 - 3	6.3	0.47	66.6	Single Dose; 1.5 ft above sediment surface
		3 - 6	5.3	0.59	58.7	
		6 - 12	5.7	0.55	60.8	
10/2	TEST-TU-21	0 - 3	5.8	0.4	66.0	Double Dose; 0.3 ft above sediment surface
		3 - 6	3.8	0.55	57.6	
		6 - 12	5.2	0.54	60.3	
10/2	TEST-TU-22	0 - 3	5.2	0.32	69.2	
		3 - 6	4.1	0.62	57.7	
		6 - 12	3.9	0.51	62.4	
10/2	TEST-TU-23	0 - 3	5.5	0.48	62.3	Single Dose; 0.3 ft above sediment surface
		3 - 6	2.9	0.62	52.0	
		6 - 12	3.7	0.53	59.5	
10/2	TEST-TU-24	0 - 3	6.5	0.43	67.3	
		3 - 6	4.5	0.62	56.5	
		6 - 12	5.6	0.58	59.2	
10/2	TEST-TU-25	0 - 3	8.5	0.34	70.2	
		3 - 6	5.1	0.57	58.7	
		6 - 12	5.2	0.51	61.0	

(continued)

Table A-16
During-Construction Sediment Results for the Initial Testing Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm3)	Percent Moisture (%)	Application Description
Tine Sled Testing						
9/27	TEST-TS-02	0 - 3	5.8	0.43	65.9	Single Dose; 10 ft/minute
		3 - 6	6.5	0.45	63.6	
10/2	TEST-TS-03	0 - 6	6.7	0.38	67.9	
		6 - 12	6.9	0.49	64.2	
		12 - 18	6.2	0.48	62.4	
		18 - 22	6.7	0.56	60.4	
10/6	TEST-TS-03	0 - 3	5.6	0.40	67.0	
		3 - 6	5.6	0.47	63.7	
10/2	TEST-TS-04	0 - 6	8.3 (6.0)	0.44 (0.41)	68.1 (68.6)	Double Dose; 5 ft/minute
		6 - 12	6.5	0.50	62.9	
		12 - 18	6.6	0.44	64.5	
		18 - 22	5.9	0.53	57.5	
10/6	TEST-TS-04	0 - 3	8.0	0.35	71.4	
		3 - 6	5.5	0.46	65.2	
9/27	TEST-TS-05	0 - 3	7.3 (8.5)	0.39 (0.36)	67.6 (68.9)	Single Dose; 10 ft/minute
		3 - 6	6.0	0.49	59.6	
9/28	TEST-TS-05	0 - 6	3.5	0.38	69.5	
		6 - 12	5.5	0.46	63.7	
		12 - 18	6.4	0.48	63.4	
		18 - 22	5.9	0.47	60.9	
10/2	TEST-TS-06	0 - 6	6.7 (6.9)	0.43 (0.39)	66.9 (67.3)	
		6 - 12	6.2	0.46	64.7	
		12 - 18	5.7	0.57	60.1	
		18 - 24	7.9	0.46	62.1	
10/6	TEST-TS-06	0 - 3	12.0 (11.0)	0.36 (0.32)	70.1 (70.0)	
		3 - 6	3.6	0.41	67.2	
9/28	TEST-TS-07	0 - 3	5.3	0.42	62.1	
		3 - 6	6.5	0.39	68.1	
9/27	TEST-TS-08	0 - 3	5.6	0.41	65.6	
		3 - 6	5.6	0.47	61.0	
10/2	TEST-TS-09	0 - 6	6.3	0.40	68.1	
		6 - 12	6.8	0.47	62.9	
		12 - 18	6.2	0.56	58.3	
		18 - 21	10.0	0.45	64.4	
10/2	TEST-TS-10	0 - 6	8.5	0.41	67.9	Double Dose; 5 ft/minute
		6 - 12	7.3	0.47	63.9	
		12 - 18	6.4	0.56	58.5	
		18 - 24	8.8	0.51	61.5	
10/6	TEST-TS-10	0 - 3	12.0	0.34	70.8	
		3 - 6	7.3	0.50	61.9	
9/27	TEST-TS-11	0 - 3	6.5	0.39	68.6	Single Dose; 10 ft/minute
		3 - 6	4.7	0.56	59.2	
10/2	TEST-TS-12	0 - 6	8.4	0.37	70.3	
		6 - 12	7.0	0.45	64.4	
		12 - 18	6.5	0.53	59.3	
		18 - 24	9.0	0.45	64.1	
10/6	TEST-TS-12	0 - 3	7.3	0.35	71.1	
		3 - 6	5.7	0.45	65.8	
10/2	TEST-TS-13	0 - 6	8.6	0.45	65.4	Double Dose; 5 ft/minute
		6 - 12	6.7	0.49	62.6	
		12 - 18	7.5	0.48	63.1	
		18 - 24	7.4	0.51	61.5	
9/27	TEST-TS-14	0 - 3	6.2	0.38	69.1	Single Dose; 10 ft/minute
		3 - 6	4.9	0.51	60.7	
9/26	TEST-TS-15	0 - 6	6.8	0.39	65.5	
		6 - 12	6.5	0.43	64.9	
		12 - 18	6.7	0.49	61.3	
		18 - 24	8.5	0.50	61.0	

(continued)

Table A-16
During-Construction Sediment Results for the Initial Testing Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm3)	Percent Moisture (%)	Application Description
Mixed Tiller (Accepted Method Testing)						
10/3	TEST-AM-02	0 - 3	6.5	0.34	70.9	Double Dose; 0.3 ft above sediment surface
		3 - 6	5.2	0.47	68.5	
10/3	TEST-AM-02A	0 - 3	5.9 (7.5)	0.37 (0.34)	71.2 (72.1)	
		3 - 6	4.2	0.42	65.1	
10/3	TEST-AM-02B	0 - 3	3.8	0.34	71.7	
		3 - 6	6.5	0.41	65.9	
10/3	TEST-AM-02C	0 - 3	5.9	0.36	70.1	
		3 - 6	3.8	0.43	65.2	
10/3	TEST-AM-02D	0 - 3	6.8 (8.0)	0.33 (0.33)	73.5 (71.1)	
		3 - 6	6.7	0.34	70.5	
10/3	TEST-AM-03	0 - 3	7.6	0.41	69.7	
		3 - 6	8.0	0.35	72.4	
10/3	TEST-AM-05	0 - 3	6.4	0.31	75.2	Double Dose; 0.2 ft above sediment surface
		3 - 6	6.9	0.43	63.8	
10/3	TEST-AM-06	0 - 3	6.2	0.34	71.0	
		3 - 6	5.1	0.46	67.2	
10/3	TEST-AM-17	0 - 3	8.0	0.32	74.3	Double Dose; 0.3 ft above sediment surface
		3 - 6	6.1	0.40	68.3	
10/3	TEST-AM-18	0 - 3	8.9	0.31	72.1	
		3 - 6	6.0	0.37	68.7	
10/3	TEST-AM-19	0 - 3	8.3	0.37	70.7	Double Dose; 0.2 ft above sediment surface
		3 - 6	6.8	0.46	66.3	
10/3	TEST-AM-20	0 - 3	9.8	0.30	73.8	
		3 - 6	4.5	0.31	72.2	

Notes:
1. Duplicate values are shown in parenthesis.
2. Stations were previously identified as 'TM-11', 'TM-12' and 'TM-13'.

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
(g/cm^3) = grams per cubic centimeter

Table A-17
During-Construction Sediment Results for the Mixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm^3)	Percent Moisture (%)	Black Carbon[5] (%)	Application Description
Mixed Tiller							
10/4	MTA-1	0 - 3	6.30 (4.70)	0.36 (0.36)	70.3	---	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 4 minute wait for turbidity to settle
		3 - 6	5.00	0.49	62.3	---	
10/4	MTA-2	0 - 3	12.00	0.34	69.5	---	
		3 - 6	4.30	0.44	64.5	---	
10/11[4]	MTA-2	0 - 3	10.00	0.35	70.6	5.13	
		3 - 6	5.40	0.48	64.8	0.20	
10/4	MTA-3	0 - 3	8.30	0.35	71.4	---	
		3 - 6	3.70	0.47	64.7	---	
10/5	MTA-3A	0 - 3	10.00	0.36	70.3	---	
		3 - 6	7.50	0.40	65.9	---	
		6 - 12	8.30	0.42	65.7	---	
10/11[4]	MTA-3	0 - 3	9.50	0.33	72.1	4.91	
		3 - 6	4.30	0.42	65.0	0.93	
10/5	MTA-4	0 - 3	6.20 (5.60)	0.35 (0.35)	71.6 (70.7)	---	1 1/2 Dose; 12-15 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle
		3 - 6	5.40	0.39	69.5	---	
		6 - 12	4.90	0.41	63.8	---	
10/5	MTA-5	0 - 3	5.00	0.36	70.4	---	1 1/2 Dose; 12-15 RPM; 10 minute wait for turbidity to settle; Tiller rotated 90 degrees and remixed; 0.3 ft above sediment surface; 3 minute wait for turbidity to settle
		3 - 6	7.10	0.44	64.9	---	
		6 - 12	4.90	0.47	64.4	---	
10/11[4]	MTA-5	0 - 3	6.20	0.37	69.7	2.19	
		3 - 6	6.60	0.41	66.2	0.22	
10/5	MTA-6	0 - 3	6.10	0.36	70.5	---	
		3 - 6	4.50	0.45	64.3	---	
10/11[4]	MTA-6	0 - 3	14.00	0.37	70.4	5.00	
		3 - 6	9.00	0.35	69.4	0.26	
10/6	MTA-7	0 - 3	7.90	0.34	70.6	---	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle
		3 - 6	6.60	0.35	70.9	---	
		6 - 12	5.60	0.44	64.7	---	
10/13	MTA-7	0 - 3	13.00	0.34	72.2	4.83	
		3 - 6	7.80	0.38	71.0	0.55	
10/6	MTA-8	0 - 3	6.60	0.41	67.0	---	
		3 - 6	5.20	0.46	65.0	---	
10/6	MTA-9	0 - 3	6.20 (3.80)	0.32 (0.33)	72.6 (72.5)	---	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; Settling time increased to 15 min.
		3 - 6	5.10	0.47	62.8	---	
10/9	MTA-10	0 - 3	6.10	0.35	71.4	---	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 10 min settling time; Nozzles inspected after 5 cells
		3 - 6	5.00	0.44	64.1	---	
10/13	MTA-10	0 - 3	11.00 (12.00)	0.37 (0.36)	69.9 (70.9)	4.54 (4.60)	
		3 - 6	10.00	0.40	68.4	0.25	
10/9	MTA-11	0 - 3	5.50 (6.20)	0.31 (0.33)	72.7 (72.8)	---	
		3 - 6	3.80	0.44	66.5	---	
10/9	MTA-12	0 - 3	5.90	0.33	72.4	---	
		3 - 6	5.00	0.47	62.2	---	
10/10	MTA-13	0 - 3	13.00	0.33	72.3	---	
		3 - 6	5.90	0.35	71.6	---	
10/10	MTA-14	0 - 3	8.40 (12.00)	0.27 (0.28)	74.4 (74.0)	---	
		3 - 6	5.10	0.37	69.0	---	
10/10	MTA-15	0 - 3	5.70	0.36	69.8	---	
		3 - 6	5.40	0.43	66.5	---	
10/10	MTA-16	0 - 3	4.90 (7.60)	0.34 (0.35)	71.8 (71.8)	---	
		3 - 6	6.20	0.46	64.4	---	
		6 - 12	4.50	0.42	64.9	---	
10/11[4]	MTA-16	0 - 3	12.00	0.36	70.6	5.52	
		3 - 6	8.90	0.36	69.8	1.25	

(continued)

Table A-17
During-Construction Sediment Results for the Mixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm^3)	Percent Moisture (%)	Black Carbon[5] (%)	Application Description
10/4	MTA-17	0 - 3	5.40	0.33	72.2	1.01	1 1/2 Dose; tiller mixed at >12-15 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle
		3 - 6	18.00	0.46	64.0	0.09	
		6 - 12	5.30	0.44	65.6	0.13	
10/4	MTA-17A	0 - 3	5.30	0.33	72.2	1.56	
		3 - 6	5.20	0.47	62.8	0.21	
		6 - 12	---	---	---	0.15	
10/4	MTA-17B	0 - 3	6.00	0.28	75.7	0.96	
		3 - 6	4.40	0.45	63.2	0.15	
		6 - 12	---	---	---	0.19	
10/4	MTA-17C	0 - 3	4.70	0.32	71.5	1.21	
		3 - 6	4.40	0.48	63.7	0.18	
		6 - 12	---	---	---	0.28	
10/4	MTA-17D	0 - 3	5.10	0.31	73.3	0.89	
		3 - 6	5.30	0.42	65.9	0.15	
		6 - 12	---	---	---	0.19	
10/11[4]	MTA-17	0 - 3	7.20 (7.70)	0.35 (0.35)	70.7 (71.1)	2.95 (3.18)	
		3 - 6	5.70	0.44	65.3	0.21	
10/4	MTA-18[3]	0 - 3	5.10 (4.20)	0.33 (0.34)	71.4 (72.4)	1.13 (1.21)	1 1/2 Dose; tiller mixed at >12-15 RPM; 10 minute wait for turbidity to settle; Tiller rotated 90 degrees and re-mixed; 0.3 ft above sediment surface; 3 minute wait for turbidity to settle
		3 - 6	5.50	0.43	64.4	0.07	
		6 - 12	---	---	---	0.19	
10/4	MTA-18A[3]	0 - 3	7.30	0.32	73.8	1.95	
		3 - 6	4.60	0.46	64.4	0.10	
		6 - 12	---	---	---	0.20	
10/4	MTA-18B[3]	0 - 3	15.00	0.40	67.3	9.05	
		3 - 6	5.80	0.43	64.7	0.14	
		6 - 12	---	---	---	0.20	
10/4	MTA-18C[3]	0 - 3	7.20	0.29	73.4	2.39	
		3 - 6	5.30	0.45	64.2	0.10	
		6 - 12	---	---	---	0.16	
10/4	MTA-18D[3]	0 - 3	11.00	0.30	73.4	10.13	
		3 - 6	4.30	0.46	63.4	0.25	
		6 - 12	---	---	---	0.15	
10/11[4]	MTA-18	0 - 3	6.30	0.38	69.1	1.86	
		3 - 6	4.70	0.40	64.1	0.11	
10/6	MTA-19	0 - 3	6.70	0.35	70.6	---	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle
		3 - 6	5.60	0.43	65.2	---	
10/6	MTA-20	0 - 3	10.00	0.36	70.0	---	
		3 - 6	6.00	0.44	65.6	---	
		6 - 12	5.20	0.53	59.2	---	
10/10	MTA-21	0 - 3	7.20	0.35	70.8	1.89	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle; inspected nozzles every 5 cells
		3 - 6	3.10	0.47	64.2	0.24	
		6 - 12	---	---	---	0.17	
10/10	MTA-22	0 - 3	7.30	0.34	71.1	2.19	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 4 minute wait for turbidity to settle
		3 - 6	4.60	0.46	64.2	0.44	
		6 - 12	---	---	---	0.17	
10/10	MTA-23	0 - 3	5.30	0.35	70.8	1.52	
		3 - 6	5.30	0.40	66.9	0.17	
		6 - 12	---	---	---	0.24	

(continued)

Table A-17
During-Construction Sediment Results for the Mixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm³)	Percent Moisture (%)	Black Carbon[5] (%)	Application Description
10/10	MTA-24	0 - 3	5.50	0.37	70.1	1.39	1 1/2 Dose; tiller mixed at >12-15 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle
		3 - 6	5.60	0.48	64.7	0.15	
		6 - 12	---	---	---	0.19	
10/10	MTA-25	0 - 3	4.90	0.35	71.9	1.14	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle
		3 - 6	3.90	0.48	64.8	0.08	
		6 - 12	---	---	---	0.18	
10/10	MTA-26	0 - 3	4.80	0.36	69.8	0.17	1 1/2 Dose; 5-7 RPM; 0.3 ft above sediment surface; 10 minute wait for turbidity to settle; Nozzles inspected after 5 cells
		3 - 6	6.50	0.47	63.3	0.16	
		6 - 12	5.60	0.40	65.3	0.15	
10/10	MTA-27	0 - 3	8.70 (10.00)	0.28 (0.31)	74.1 (74.4)	5.74 (5.14)	
		3 - 6	6.30	0.43	68.3	0.17	
		6 - 12	5.80	0.41	65.8	0.17	
10/10	MTA-28	0 - 3	6.50	0.34	71.0	0.52	
		3 - 6	5.50	0.47	62.8	0.12	
		6 - 12	---	---	---	0.16	
10/10	MTA-29	0 - 3	8.00	0.37	70.5	4.92	
		3 - 6	6.70	0.34	72.6	0.06	
		6 - 12	4.40	0.45	60.9	0.25	
10/10	MTA-30	0 - 3	6.40	0.33	71.9	1.79	
		3 - 6	5.90	0.43	64.9	0.06	
		6 - 12	---	---	---	0.21	
10/11[4]	MTA-30	0 - 3	8.80	0.35	71.1	1.56	
		3 - 6	6.10	0.45	65.1	0.12	

Notes:
1. Duplicate values are shown in parenthesis. '---' = Sample not analyzed.
2. Corrected black carbon measurement adjusted to reflect low matrix spike recoveries (~0.59%).
3. Nozzles showed signs of plugging and were cleaned during application of the footprint from which the five MTA-18 samples were collected.
4. Data collected on 10/11 and 10/13 is based on composite samples from 5 cores collected within each footprint.
5. Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C).

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
(g/cm³) = grams per cubic centimeter

Table A-18.
Three Method Average Delta TOC and Black Carbon (BC-C) Results for the Mixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Test	Core Station ID	Depth Interval (inches)	Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Single 3-inch Cores							Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Composite of Five 3-inch Cores Collected Over a 3-ft x 3-ft Area						
				Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]		Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]
Mixed Tiller																		
	MTA-01	0 - 3	0.36	6.4%	5.5%	-0.90%	0.11%	0.50%	**-0.10%**									
	MTA-01	3 - 6	0.49	4.2%	5.0%													
	MTA-02	0 - 3	0.34	6.1%	12.0%	5.90%	6.61%	7.70%	**6.74%**		0.35	6.1%	10.0%	3.90%	4.61%	4.60%	**4.37%**	5.03%
	MTA-02	3 - 6	0.44	5.4%	4.3%						0.48	5.4%	5.4%					
	MTA-03	0 - 3	0.35	4.1%	8.3%	4.20%	2.91%	4.60%	**3.90%**		0.33	4.1%	9.5%	5.40%	4.11%	5.20%	**4.90%**	4.81%
	MTA-03	3 - 6	0.47	5.6%	3.7%						0.42	5.6%	4.3%					
	MTA-03A	0 - 3	0.36	4.1%	10.0%	5.90%	4.61%	2.50%	**4.34%**									
	MTA-03A	3 - 6	0.40	5.6%	7.5%													
	MTA-04	0 - 3	0.35	5.6%	5.9%	0.30%	0.51%	0.50%	**0.44%**									
	MTA-04	3 - 6	0.39	4.2%	5.4%													
	MTA-05	0 - 3	0.36	5.0%	5.0%	0.00%	-0.39%	-2.10%	**-0.83%**		0.37	5.0%	6.2%	1.20%	0.81%	-0.40%	**0.54%**	2.09%
	MTA-05	3 - 6	0.44	6.4%	7.1%						0.41	6.4%	6.6%					
	MTA-06	0 - 3	0.36	4.1%	6.1%	2.00%	0.71%	1.60%	**1.44%**		0.37	4.1%	14.0%	9.90%	8.61%	5.00%	**7.84%**	4.90%
	MTA-06	3 - 6	0.45	4.4%	4.5%						0.35	4.4%	9.0%					
	MTA-07	0 - 3	0.34	6.1%	7.9%	1.80%	2.51%	1.30%	**1.87%**		0.34	6.1%	13.0%	6.90%	7.61%	5.20%	**6.57%**	4.73%
	MTA-07	3 - 6	0.35	3.8%	6.6%						0.38	3.8%	7.8%					
	MTA-08	0 - 3	0.41	7.1%	6.6%	-0.50%	1.21%	1.40%	**0.70%**									
	MTA-08	3 - 6	0.46	6.6%	5.2%													
	MTA-09	0 - 3	0.32	4.3%	5.0%	0.70%	-0.39%	-0.10%	**0.07%**									
	MTA-09	3 - 6	0.47	4.1%	5.1%													
	MTA-10	0 - 3	0.35	5.1%	6.1%	1.00%	0.71%	1.10%	**0.94%**		0.37	5.1%	11.5%	6.40%	6.11%	1.50%	**4.67%**	4.47%
	MTA-10	3 - 6	0.44	4.7%	5.0%						0.40	4.7%	10.0%					
	MTA-11	0 - 3	0.31	5.8%	5.9%	0.05%	0.46%	2.05%	**0.85%**									
	MTA-11	3 - 6	0.44	6.7%	3.8%													
	MTA-12	0 - 3	0.33	4.7%	5.9%	1.20%	0.51%	0.90%	**0.87%**									
	MTA-12	3 - 6	0.47	5.6%	5.0%													
	MTA-13	0 - 3	0.33	5.4%	13.0%	7.60%	7.61%	7.10%	**7.44%**									
	MTA-13	3 - 6	0.35	5.6%	5.9%													
	MTA-14	0 - 3	0.27	7.0%	10.2%	3.20%	4.81%	5.10%	**4.37%**									
	MTA-14	3 - 6	0.37	6.5%	5.1%													
	MTA-15	0 - 3	0.36	5.5%	5.7%	0.25%	0.31%	0.30%	**0.29%**									
	MTA-15	3 - 6	0.43	6.6%	5.4%													
	MTA-16	0 - 3	0.34	4.9%	6.3%	1.35%	0.86%	0.05%	**0.75%**		0.36	4.9%	12.0%	7.10%	6.61%	3.10%	**5.60%**	5.42%
	MTA-16	3 - 6	0.46	5.2%	6.2%						0.36	5.2%	8.9%					
	MTA-17	0 - 3	0.33	*5.4%*	5.4%		0.01%	-12.60%	**-6.30%**	0.91%	0.35	*5.4%*	7.5%		2.06%	1.75%	**1.90%**	2.96%
	MTA-17	3 - 6	0.46	*5.4%*	18.0%						0.44	*5.4%*	5.7%					
	MTA-17A	0 - 3	0.33	*5.4%*	5.3%		-0.09%	0.10%	**0.00%**	1.46%								
	MTA-17A	3 - 6	0.47	*5.4%*	5.2%													
	MTA-17B	0 - 3	0.28	*5.4%*	6.0%		0.61%	1.60%	**1.10%**	0.86%								
	MTA-17B	3 - 6	0.45	*5.4%*	4.4%													
	MTA-17C	0 - 3	0.32	*5.4%*	4.7%		-0.69%	0.30%	**-0.20%**	1.11%								
	MTA-17C	3 - 6	0.48	*5.4%*	4.4%													
	MTA-17D	0 - 3	0.31	*5.4%*	5.1%		-0.29%	-0.20%	**-0.25%**	0.79%								
	MTA-17D	3 - 6	0.42	*5.4%*	5.3%													

(continued)

Table A-18.
Three Method Average Delta TOC and Black Carbon (BC-C) Results for the Mixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Test	Core Station ID	Depth Interval (inches)	Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Single 3-inch Cores							Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Composite of Five 3-inch Cores Collected Over a 3-ft x 3-ft Area						
				Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]		Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]
Mixed Tiller (continued)																		
	MTA-18	0 - 3	0.34	*5.4%*	4.7%		-0.74%	-0.85%	**-0.80%**	1.07%	0.38	*5.4%*	6.3%		0.91%	1.60%	**1.25%**	1.76%
	MTA-18	3 - 6	0.43	*5.4%*	5.5%						0.40	*5.4%*	4.7%					
	MTA-18A	0 - 3	0.32	*5.4%*	7.3%		1.91%	2.70%	**2.30%**	1.85%								
	MTA-18A	3 - 6	0.46	*5.4%*	4.6%													
	MTA-18B	0 - 3	0.40	*5.4%*	15.0%		9.61%	9.20%	**9.40%**	8.95%								
	MTA-18B	3 - 6	0.43	*5.4%*	5.8%													
	MTA-18C	0 - 3	0.29	*5.4%*	7.2%		1.81%	1.90%	**1.85%**	2.29%								
	MTA-18C	3 - 6	0.45	*5.4%*	5.3%													
	MTA-18D	0 - 3	0.30	*5.4%*	11.0%		5.61%	6.70%	**6.15%**	10.03%								
	MTA-18D	3 - 6	0.46	*5.4%*	4.3%													
	MTA-19	0 - 3	0.35	*5.4%*	6.7%		1.31%	1.10%	**1.20%**									
	MTA-19	3 - 6	0.43	*5.4%*	5.6%													
	MTA-20	0 - 3	0.36	*5.4%*	10.0%		4.61%	4.00%	**4.30%**									
	MTA-20	3 - 6	0.44	*5.4%*	6.0%													
	MTA-21	0 - 3	0.35	*5.4%*	7.2%		1.81%	4.10%	**2.95%**	1.79%								
	MTA-21	3 - 6	0.47	*5.4%*	3.1%													
	MTA-22	0 - 3	0.34	*5.4%*	7.3%		1.91%	2.70%	**2.30%**	2.09%								
	MTA-22	3 - 6	0.46	*5.4%*	4.6%													
	MTA-23	0 - 3	0.35	*5.4%*	5.3%		-0.09%	0.00%	**-0.05%**	1.42%								
	MTA-23	3 - 6	0.40	*5.4%*	5.3%													
	MTA-24	0 - 3	0.37	*5.4%*	5.5%		0.11%	-0.10%	**0.00%**	1.29%								
	MTA-24	3 - 6	0.48	*5.4%*	5.6%													
	MTA-25	0 - 3	0.35	*5.4%*	4.9%		-0.49%	1.00%	**0.25%**	1.04%								
	MTA-25	3 - 6	0.48	*5.4%*	3.9%													
	MTA-26	0 - 3	0.36	*5.4%*	4.8%		-0.59%	-1.70%	**-1.15%**	0.07%								
	MTA-26	3 - 6	0.47	*5.4%*	6.5%													
	MTA-27	0 - 3	0.30	*5.4%*	9.4%		3.96%	3.05%	**3.50%**	5.34%								
	MTA-27	3 - 6	0.43	*5.4%*	6.3%													
	MTA-28	0 - 3	0.34	*5.4%*	6.5%		1.11%	1.00%	**1.05%**	0.42%								
	MTA-28	3 - 6	0.47	*5.4%*	5.5%													
	MTA-29	0 - 3	0.37	*5.4%*	8.0%		2.61%	1.30%	**1.95%**	4.82%								
	MTA-29	3 - 6	0.34	*5.4%*	6.7%													
	MTA-30	0 - 3	0.33	*5.4%*	6.4%		1.01%	0.50%	**0.75%**	1.69%	0.35	*5.4%*	8.8%		3.41%	2.70%	**3.05%**	1.46%
	MTA-30	3 - 6	0.43	*5.4%*	5.9%						0.45	*5.4%*	6.1%					
		0 - 3" Avg.				2.00%	1.76%	1.55%	**1.65%**	**2.46%**				5.83%	4.48%	3.03%	**4.07%**	**3.76%**
		0 - 3" SE				0.63%	0.40%	0.56%	**0.45%**	**0.63%**				1.12%	0.91%	0.64%	**0.79%**	**0.51%**

Notes:
1. Duplicates are averaged prior to calculation.
2. An average of 5.4% is assumed for the baseline TOC.
3. 'Post-Pre Station Delta' is not calculated for stations where baseline data is unavailable.
4. Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C), and a calculated average baseline level of 0.1%..
5. Delta values below zero are set to zero prior to averaging.

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
SE = standard error
g/cm^3 = grams per centimeter cubed

Table A-19.
Sediment Sample Count by Increase in Carbon for the Mixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

% Increase in Carbon	Number (%) of Samples by TOC Bin[1]		Number (%) of Samples by Black Carbon Bin[2]	
	Single Point	5-Point	Single Point	5-Point
0.0-0.5	13 (33%)	0 (0%)	2 (10%)	0 (0%)
0.5-1.0	7 (18%)	1 (10%)	3 (15%)	0 (0%)
1.0-1.5	4 (10%)	1 (10%)	6 (30%)	1 (10%)
1.5-2.0	3 (8%)	1 (10%)	3 (15%)	1 (10%)
2.0-2.5	2 (5%)	0 (0%)	2 (10%)	1 (10%)
>2.5	10 (26%)	7 (70%)	4 (20%)	7 (70%)
Total # of Samples:	39	10	20	10

Notes:
1. Increase in TOC based on three method average delta, with an assumed average baseline of 5.4%.
2. Black carbon results based on the black carbon-chemical preoxidation method (BC-C), and a

calculated average baseline level of 0.1%.
TOC = total organic carbon
% = percent of total

Table A-20
During-Construction Sediment Results for the Tine Sled Mixed Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm^3)	Percent Moisture (%)	Black Carbon[5] (%)	Application Description
Tine Sled [2]							
10/17	TSUTA-1	0 - 3	11.00	0.35	70.1	---	1 1/2 dose; 5 feet per minute
		3 - 6	7.70	0.42	67.0	---	
		6 - 12	4.90	0.41	67.4	---	
	TSUTA-1-COMP	0 - 3	8.40	0.37	70.2	2.51	
		3 - 6	6.50	0.42	66.9	0.14	
10/18	TSUTA-2	0 - 3	4.10 (4.70)	0.40 (0.40)	68.4 (68.5)	--- (2.87)	
		3 - 6	4.60	0.41	63.4	---	
		6 - 12	5.50	0.45	64.8	---	
	TSUTA-2-COMP	0 - 3	4.80	0.39	68.3	3.04	
		3 - 6	4.00	0.41	64.0	1.30	
10/17	TSUTA-3	0 - 3	8.10	0.39	69.3	---	
		3 - 6	6.40	0.48	62.0	---	
		6 - 12	1.70	0.48	62.7	---	
	TSUTA-3-COMP	0 - 3	10.00	0.37	68.4	3.90	
		3 - 6	5.40	0.46	53.8	0.11	
10/17	TSUTA-4	0 - 3	9.60	0.40	68.7	---	
		3 - 6	6.30	0.43	63.1	---	
		6 - 12	5.30	0.45	65.4	0.15	
	TSUTA-4-COMP	0 - 3	8.20	0.39	71.4	1.51	
		3 - 6	7.10	0.41	67.1	---	
10/18	TSUTA-5	0 - 3	5.50	0.39	69.9	---	
		3 - 6	5.20	0.44	64.5	---	
		6 - 12	5.40	0.44	64.5	---	
	TSUTA-5-COMP	0 - 3	6.20	0.38	69.4	2.09	
		3 - 6	3.40	0.44	64.1	0.24	
10/17	TSUTA-6	0 - 3	8.10	0.38	69.5	---	
		3 - 6	4.80	0.48	62.0	---	
		6 - 12	5.20	0.41	63.9	---	
	TSUTA-6-COMP	0 - 3	7.20	0.38	69.4	3.55	
		3 - 6	7.60	0.44	65.0	0.18	
10/17	TSUTA-7	0 - 3	8.20	0.40	69.5	---	
		3 - 6	9.00	0.30	72.1	---	
		6 - 12	5.00	0.46	64.8	---	
	TSUTA-7-COMP	0 - 3	12.00	0.41	68.8	6.64	
		3 - 6	4.20	0.40	67.9	0.12	
10/17	TSUTA-8[4]	0 - 3	3.90	0.36	71.8	---	
		3 - 6	5.90	0.34	68.2	---	
		6 - 12	4.30	0.47	62.7	---	
	TSUTA-8-COMP[4]	0 - 3	3.70	0.31	72.1	0.05	
		3 - 6	4.20	0.36	70.3	0.12	
10/17	TSUTA-9	0 - 3	6.90	0.39	68.5	---	
		3 - 6	5.40	0.42	68.8	---	
		6 - 12	6.10	0.40	66.2	---	
	TSUTA-9-COMP	0 - 3	7.80	0.44	69.4	3.45	
		3 - 6	6.00	0.39	70.4	0.13	

Notes:
1. Duplicate values are shown in parenthesis. '---' = Sample not analyzed.
2. 'TSUTA' samples were previously labeled 'UTA' during baseline sampling.
3. 'COMP' sample is based on composite samples from 5 cores collected within each footprint.
4. Samples 'TSUTA-8' and 'TSUTA-8-COMP' were collected from outside the treatment area.
5. Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C).

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
(g/cm^3) = grams per cubic centimeter

Table A-21.
Three Method Average Delta TOC and Black Carbon (BC-C) Results for the Tine Sled Mixed Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Test	Core Station ID	Depth Interval (inches)	Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Single 3-inch Cores							Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Composite of Five 3-inch Cores Collected Over a 3-ft x 3-ft Area						
				Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]		Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]
Tine Sled																		
	TSUTA-1	0 - 3	0.35	7.2%	11.0%	3.8%	5.6%	3.3%	**4.2%**		0.37	7.2%	8.4%	1.2%	3.0%	1.9%	**2.0%**	2.41%
	TSUTA-1	3 -6	0.42		7.7%						0.42		6.5%					
	TSUTA-2	0 - 3	0.40	6.5%	4.4%	-2.1%	-1.0%	-0.2%	**-1.1%**	2.77%	0.40	6.5%	4.8%	-1.7%	-0.6%	0.8%	**-0.5%**	2.94%
	TSUTA-2	3 -6	0.41		4.6%						0.41		4.0%					
	TSUTA-3	0 - 3	0.39	5.4%	8.1%	2.7%	2.7%	1.7%	**2.4%**		0.37	5.4%	10.0%	4.6%	4.6%	4.6%	**4.6%**	3.80%
	TSUTA-3	3 -6	0.48		6.4%						0.46		5.4%					
	TSUTA-4	0 - 3	0.40	5.7%	9.6%	3.9%	4.2%	3.3%	**3.8%**		0.39	5.7%	8.2%	2.5%	2.8%	1.1%	**2.1%**	1.41%
	TSUTA-4	3 -6	0.43		6.3%						0.41		7.1%					
	TSUTA-5	0 - 3	0.39	6.4%	5.5%	-0.9%	0.1%	0.3%	**-0.2%**		0.38	6.4%	6.2%	-0.2%	0.8%	2.8%	**1.1%**	1.99%
	TSUTA-5	3 -6	0.44		5.2%						0.44		3.4%					
	TSUTA-6	0 - 3	0.38	4.4%	8.1%	3.7%	2.7%	3.3%	**3.2%**		0.38	4.4%	7.2%	2.8%	1.8%	0.0%	**1.5%**	3.45%
	TSUTA-6	3 -6	0.48		4.8%						0.44		7.6%					
	TSUTA-7	0 - 3	0.40	3.1%	8.2%	5.1%	2.8%	-0.8%	**2.4%**		0.41	3.1%	12.0%	8.9%	6.6%	7.8%	**7.8%**	6.54%
	TSUTA-7	3 -6	0.30		9.0%						0.40		4.2%					
	TSUTA-8[6]	0 - 3	0.36	6.8%	3.9%	---	---	---	---		0.31	6.8%	3.7%	---	---	---	---	---
	TSUTA-8[6]	3 -6	0.34		5.9%						0.36		4.2%					
	TSUTA-9	0 - 3	0.39	5.1%	6.9%	1.8%	1.5%	1.5%	**1.6%**		0.44	5.1%	7.8%	2.7%	2.4%	1.8%	**2.3%**	3.35%
	TSUTA-9	3 -6	0.42		5.4%						0.39		6.0%					
		0 - 3" Avg.					2.3%	1.6%	**2.0%**	**2.77%**					2.7%	2.6%	**2.6%**	**3.24%**
		0 - 3" SE					0.8%	0.6%	**0.7%**						0.8%	1.0%	**0.9%**	**0.59%**

Notes:
1. Duplicates are averaged prior to calculation.
2. An average of 5.4% is assumed for the baseline TOC.
3. 'Post-Pre Station Delta' is not calculated for stations where baseline data is unavailable.
4. Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C), and a calculated average baseline level of 0.1%..
5. Delta values below zero are set to zero prior to averaging.
6. Samples from station 'TSUTA-8' were collected from outside the application area and are excluded from calculations.

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
g/cm^3 = grams per centimeter cubed

Table A-22.
Sediment Sample Count by Increase in Carbon for the Tine Sled Mixed Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

% Increase in Carbon	Number (%) of Samples by TOC Bin[1]		Number (%) of Samples by Black Carbon Bin[2]	
	Single Point	5-Point	Single Point	5-Point
0.0-0.5	2 (25%)	1 (13%)	0 (0%)	0 (0%)
0.5-1.0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
1.0-1.5	0 (0%)	1 (13%)	0 (0%)	1 (13%)
1.5-2.0	1 (13%)	1 (13%)	0 (0%)	1 (13%)
2.0-2.5	1 (13%)	3 (38%)	0 (0%)	1 (13%)
>2.5	4 (50%)	2 (25%)	1 (100%)	5 (63%)
Total # of Samples:	8	8	1	8

Notes:
1. Increase in TOC based on three method average delta, with an assumed average baseline of 5.4%.
2. Black carbon results based on the black carbon-chemical preoxidation method (BC-C), and a

calculated average baseline level of 0.1%.
TOC = total organic carbon
% = percent of total

Table A-23
During-Construction Sediment Results for the Unmixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Date Sampled	Location	Depth Interval (inches)	Post TOC (%)	Bulk Density (g/cm^3)	Percent Moisture (%)	Black Carbon[3] (%)	Application Description
Unmixed Tiller							
10/16	UTA-13	0 - 3	8.60 (11.00)	0.30 (0.37)	71.4	--- (5.84)	1 1/2 dose; 0.3 ft above sediment surface; 10 minute wait time for turbidity to settle
		3 - 6	5.50	0.39	68.4	---	
	UTA-13-COMP	0 - 3	8.50	0.39	69.5	5.94	
		3 - 6	6.50	0.38	66.4	0.19	
10/16	UTA-14	0 - 3	7.10	0.39	68.3	---	
		3 - 6	5.40	0.48	64.3	---	
	UTA-14-COMP	0 - 3	7.50	0.39	70.6	0.69	
		3 - 6	5.40	0.42	65.3	0.18	
10/16	UTA-15	0 - 3	7.60	0.36	70.2	---	
		3 - 6	5.30	0.50	63.1	---	
	UTA-15-COMP	0 - 3	13.00	0.39	69.7	8.59	
		3 - 6	5.70	0.42	67.9	0.15	
10/16	UTA-16	0 - 3	7.60	0.37	71.7	---	
		3 - 6	7.40	0.41	67.8	---	
	UTA-16-COMP	0 - 3	15.00	0.40	69.1	10.17	
		3 - 6	5.50	0.41	66.7	0.14	
10/16	UTA-17	0 - 3	7.30	0.38	70.9	---	
		3 - 6	5.10	0.45	64.7	---	
	UTA-17-COMP	0 - 3	14.00	0.36	71.3	8.91	
		3 - 6	4.50	0.41	71.6	0.18	
10/17	UTA-18	0 - 3	5.30 (7.30)	0.43 (0.40)	68.9 (69.2)	--- (5.95)	
		3 - 6	5.10	0.43	64.8	---	
	UTA-18-COMP	0 - 3	7.30	0.40	68.3	4.96	
		3 - 6	4.00	0.40	66.0	0.15	
10/13	UTA-19	0 - 3	12.00	0 - 3.35	70.6	---	
		3 - 6	6.50	0.43	63.9	---	
	UTA-19-COMP	0 - 3	9.00	0.35	70.9	2.00	
		3 - 6	6.40	0.48	64.6	0.12	
10/16	UTA-20	0 - 3	5.30 (5.40)	0.39 (0.38)	68.6 (69.5)	--- (1.99)	
		3 - 6	4.90	0.41	66.1	---	
	UTA-20-COMP	0 - 3	5.30	0.36	70.3	2.19	
		3 - 6	4.10	0.40	66.6	0.12	

Notes:
1. Duplicate values are shown in parenthesis. '---' = Sample not analyzed.
2. 'COMP' sample is based on composite samples from 5 cores collected within each footprint.
3. Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C).

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
(g/cm^3) = grams per cubic centimeter

Table A-24.
Three Method Average Delta TOC Results and Black Carbon (BC-C) for the Unmixed Tiller Treatment Area

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Test	Core Station ID	Depth Interval (inches)	Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Single 3-inch Cores							Dry Bulk Density (g/cm^3)	Total Organic Carbon (%): Composite of Five 3-inch Cores Collected Over a 3-ft x 3-ft Area						
				Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]		Baseline	After Application	Post-Pre Station Delta[3,5]	Post-Pre Average Delta[5]	Surf-Deep (3-6") Delta[5]	Three-Method Average Delta	Black Carbon Increase[4]
Unmixed Tiller																		
	UTA-13	0 - 3	0.30	4.3%	9.8%	5.5%	4.4%	4.3%	**4.7%**	5.74%	0.38	4.3%	8.5%	4.2%	3.1%	2.0%	**3.1%**	5.84%
	UTA-13	3 -6	0.39	*5.4%*	5.5%						0.38	*5.4%*	6.5%					
	UTA-14	0 - 3	0.39	7.3%	7.1%	-0.2%	1.7%	1.7%	**1.1%**		0.39	7.3%	7.5%	0.2%	2.1%	2.1%	**1.5%**	0.59%
	UTA-14	3 -6	0.48	*5.4%*	5.4%						0.42	*5.4%*	5.4%					
	UTA-15	0 - 3	0.36	5.4%	7.6%	2.2%	2.2%	2.3%	**2.2%**		0.39	5.4%	13.0%	7.6%	7.6%	7.3%	**7.5%**	8.49%
	UTA-15	3 -6	0.50	*5.4%*	5.3%						0.42	*5.4%*	5.7%					
	UTA-16	0 - 3	0.37	4.3%	7.6%	3.3%	2.2%	0.2%	**1.9%**		0.40	4.3%	15.0%	10.7%	9.6%	9.5%	**9.9%**	10.07%
	UTA-16	3 -6	0.41	*5.4%*	7.4%						0.41	*5.4%*	5.5%					
	UTA-17	0 - 3	0.38	*5.4%*	7.3%		1.9%	2.2%	**2.1%**		0.36	*5.4%*	14.0%		8.6%	9.5%	**9.1%**	8.81%
	UTA-17	3 -6	0.45	*5.4%*	5.1%						0.41	*5.4%*	4.5%					
	UTA-18	0 - 3	0.43	*5.4%*	6.3%		0.9%	1.2%	**1.1%**	5.85%	0.40	*5.4%*	7.3%		1.9%	3.3%	**2.6%**	4.86%
	UTA-18	3 -6	0.43	*5.4%*	5.1%						0.40	*5.4%*	4.0%					
	UTA-19	0 - 3	0.35	*5.4%*	12.0%		6.6%	5.5%	**6.1%**		0.35	*5.4%*	9.0%		3.6%	2.6%	**3.1%**	1.90%
	UTA-19	3 -6	0.43	*5.4%*	6.5%						0.48	*5.4%*	6.4%					
	UTA-20	0 - 3	0.39	*5.4%*	5.4%		0.0%	0.5%	**0.3%**	1.89%	0.37	*5.4%*	5.3%		-0.1%	1.2%	**0.6%**	2.09%
	UTA-20	3 -6	0.41	*5.4%*	4.9%						0.40	*5.4%*	4.1%					
		0 - 3" Avg.				2.7%	2.5%	2.2%	**2.42%**	**4.5%**					4.6%	4.7%	**4.7%**	**5.33%**
		0 - 3" SE				1.4%	0.8%	0.7%	**0.7%**	**1.6%**					1.3%	1.3%	**1.4%**	**1.35%**

Notes:
1. Duplicates are averaged prior to calculation.
2. An average of 5.4% is assumed for the baseline TOC.
3. 'Post-Pre Station Delta' is not calculated for stations where baseline data is unavailable.
4. Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C), and a calculated average baseline level of 0.1%..
5. Delta values below zero are set to zero prior to averaging.

ACPS = Activated Carbon Pilot Study
TOC = total organic carbon
g/cm^3 = grams per centimeter cubed

ARC- D:\ALCgra\Analysis\ACPS\tables\sediment\ACPS_3MethAvg_Carbon_ne_0_070815_JQ081707
10/25/2007 2:27 PM

Table A-25.
Sediment Sample Count by Increase in Carbon for the Unmixed Tiller Treatment Area

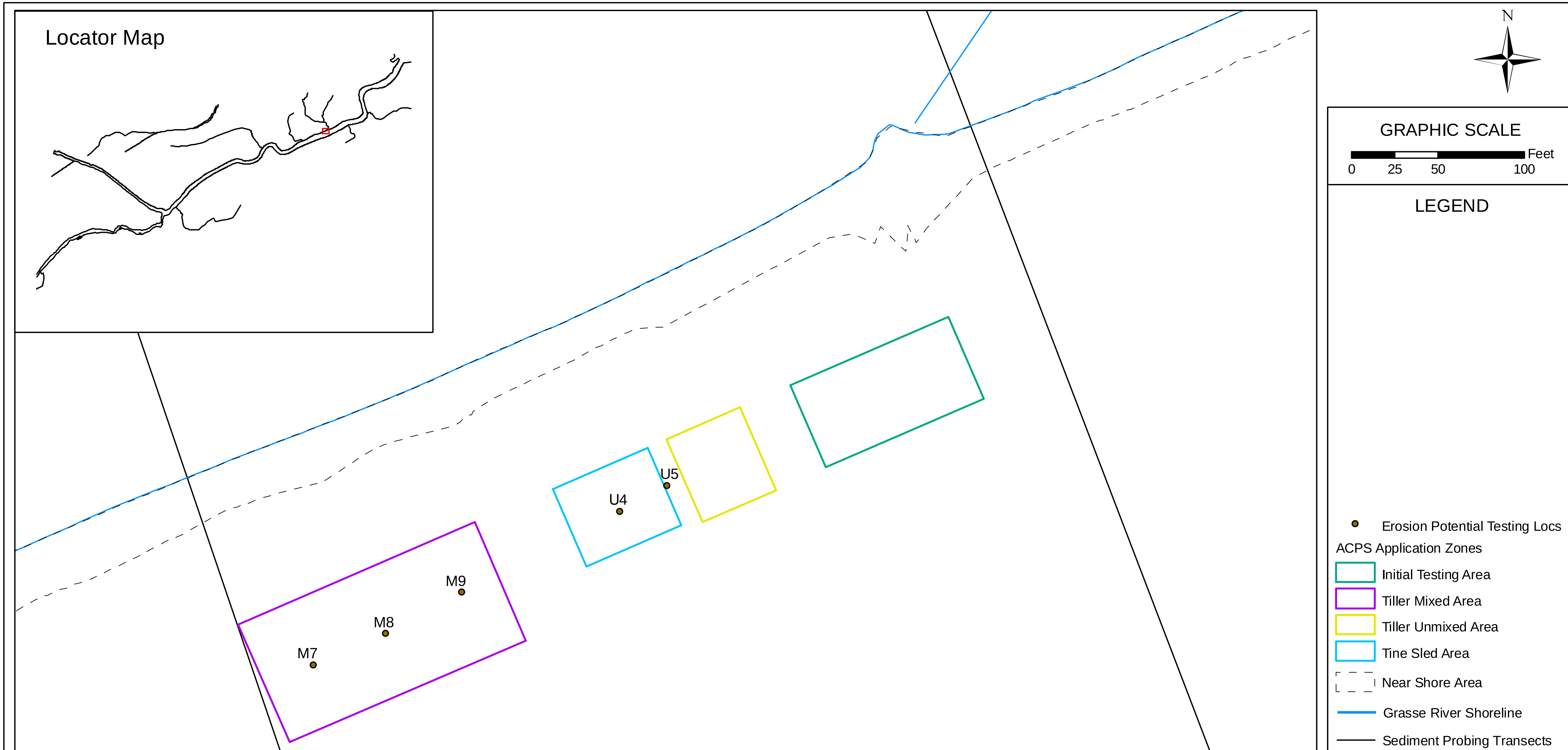
Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

% Increase in Carbon	Number (%) of Samples by TOC Bin[1]		Number (%) of Samples by Black Carbon Bin[2]	
	Single Point	5-Point	Single Point	5-Point
0.0-0.5	1 (13%)	0 (0%)	0 (0%)	0 (0%)
0.5-1.0	0 (0%)	1 (13%)	0 (0%)	1 (13%)
1.0-1.5	2 (25%)	1 (13%)	0 (0%)	0 (0%)
1.5-2.0	1 (13%)	0 (0%)	1 (33%)	1 (13%)
2.0-2.5	2 (25%)	0 (0%)	0 (0%)	1 (13%)
>2.5	2 (25%)	6 (75%)	2 (67%)	5 (63%)
Total # of Samples:	8	8	3	8

Notes:
1. Increase in TOC based on three method average delta, with an assumed average baseline of 5.4%.
2. Black carbon results based on the black carbon-chemical preoxidation method (BC-C), and a

calculated average baseline level of 0.1%.
TOC = total organic carbon
% = percent of total

Figures



GRASSE RIVER STUDY ARE
MASSENA, NEW YORK

Figure A-1.
Erosion Potential Testing
Baseline Sampling Locations

ALCOA

Nov 2006

\\Adrianne\D_DRIVE\ALCgra\Analysis\ACPS\GIS\basemaps\GAC_basemap_060925.mxd

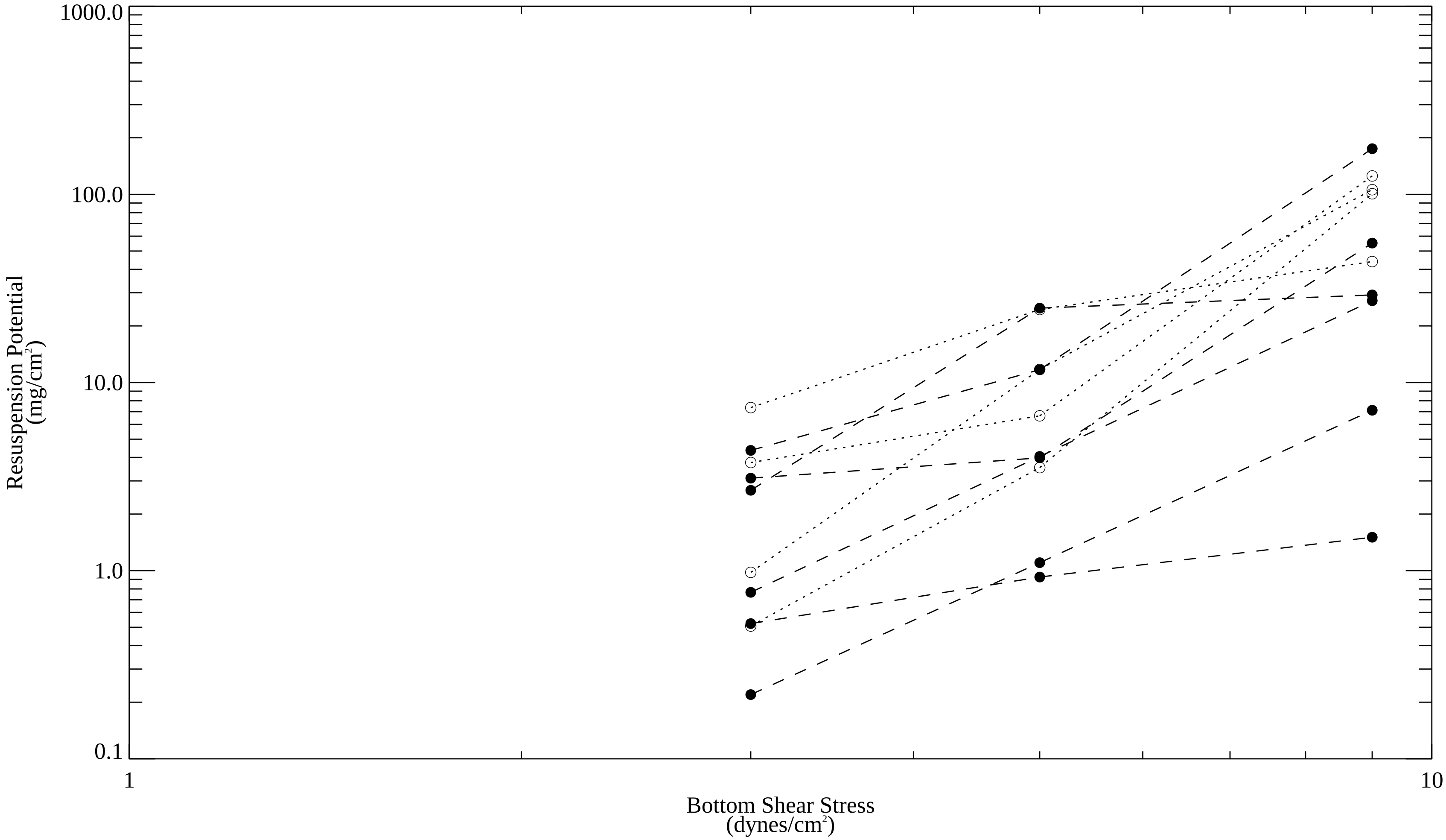


Figure A-2. Resuspension Potential as a Function of Shear Stress for All Baseline ACPS Cores

Cores collected August 2-3, 2006 for Activated Carbon Pilot Study baseline characterization.

Data table:ero_pot_ACPS

Mixed Tiller Treatment Area

Tine Sled Mixed Treatment Area

ARC - D:\ALCgra\Analysis\ACPS\IDL\shaker_study\resus_pot_vs_tau.pro
Thu Oct 25 11:34:21 2007

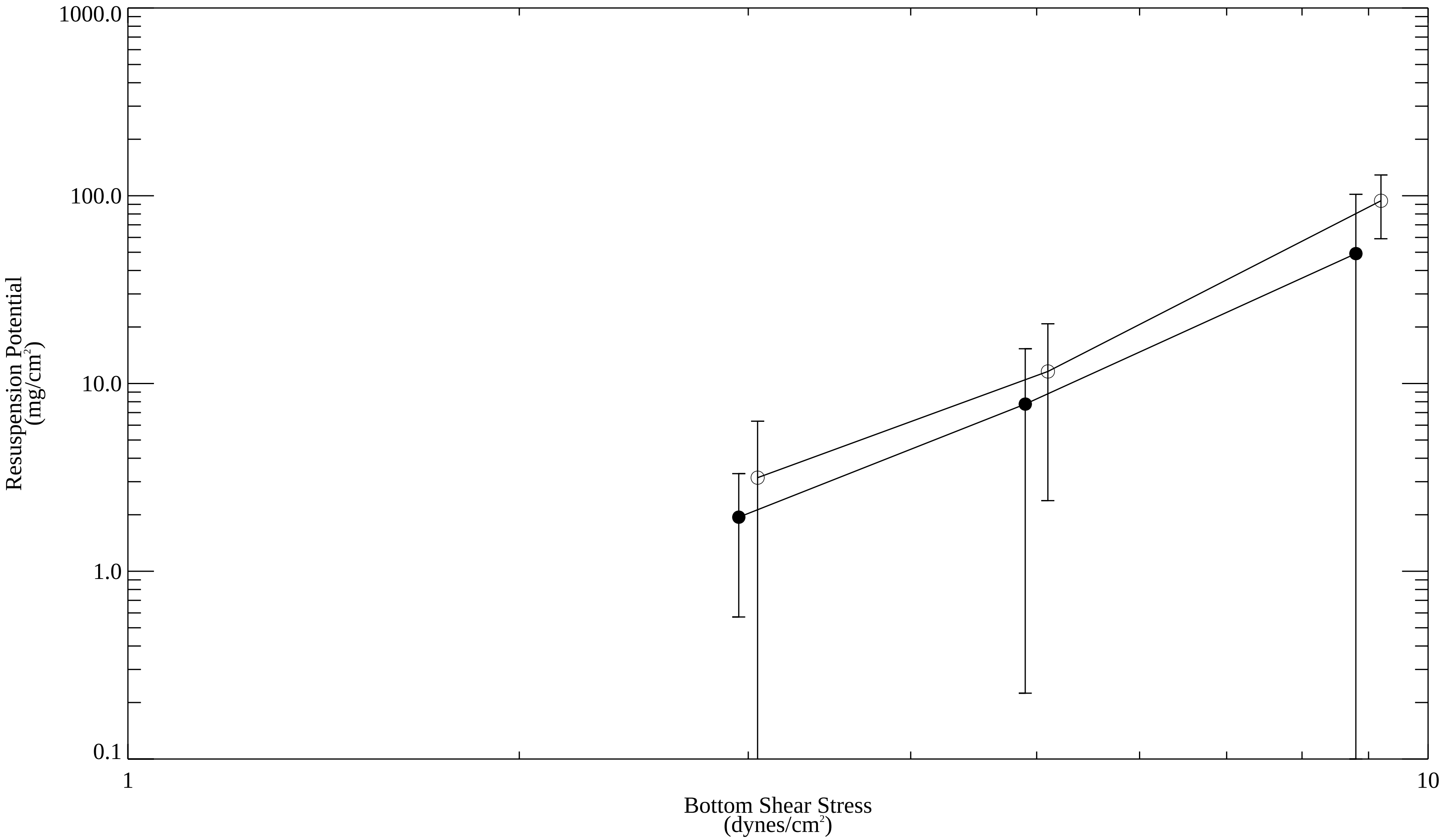


Figure A-3. Average Resuspension Potential as a Function of Shear Stress for Baseline Samples Collected from the Mixed Tiller and Tine Sled Mixed Treatment Areas

Cores collected August 2-3, 2006 for Activated Carbon Pilot Study baseline characterization.
Error bars represent +/- 2 standard errors.

Data table: ero_pot_ACPS

Mixed Tiller Treatment Area
Tine Sled Mixed Treatment Area

ARC - D:\ALCgra\Analysis\ACPS\IDL\shaker_study\resus_pot_vs_tau.pro
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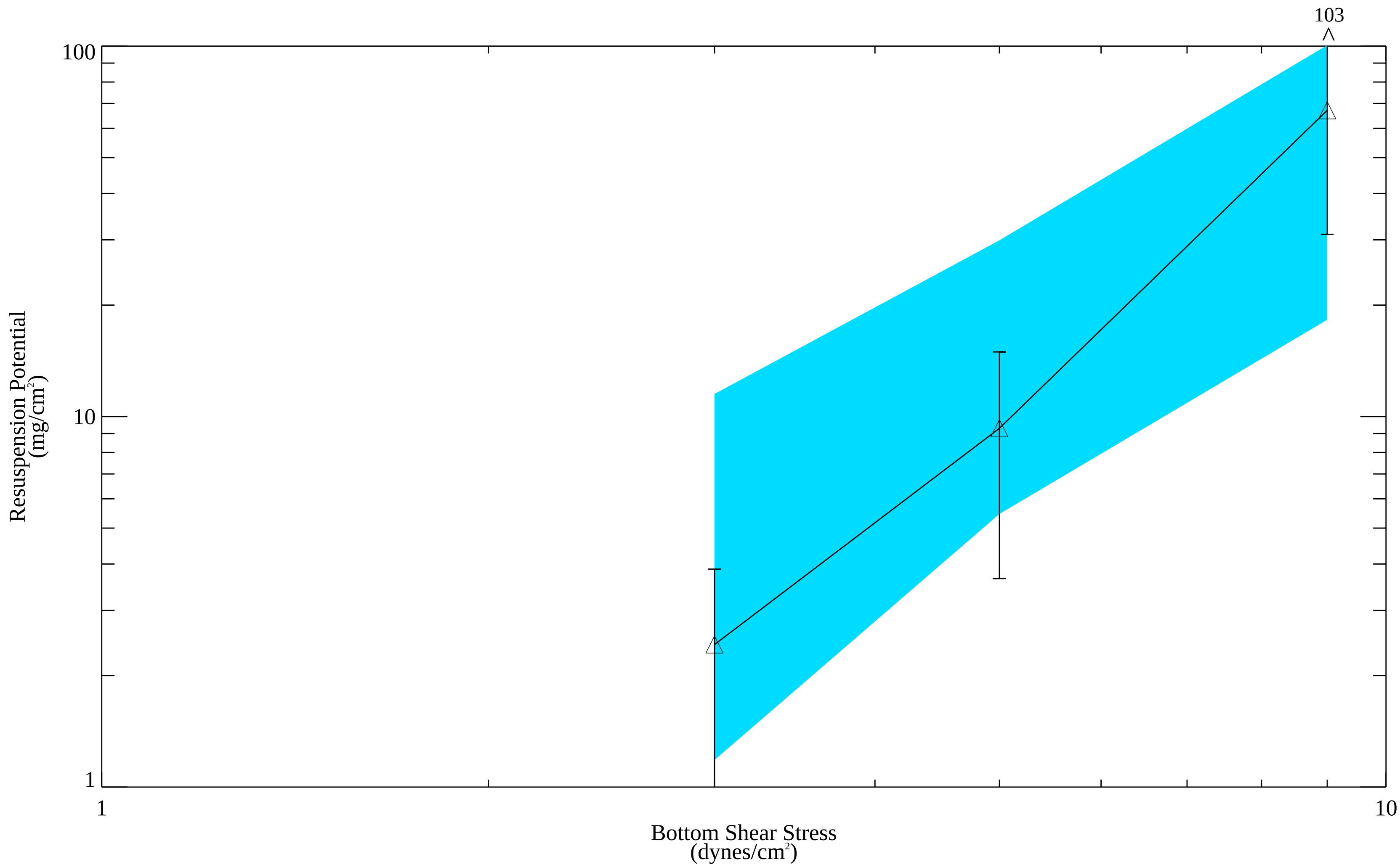

Figure A-4. Comparison of Average Resuspension Potential in the ACPS Area and Historic Measurements

Cores collected August 2-3, 2006 for Activated Carbon Pilot Study baseline characterization.

The blue polygon represents the range of historic data collected from T42 and T46 in 1998 and 2000.

Error bars represent +/- 2 standard errors.

Data table: ero_pot_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\shaker_study\resus_pot_vs_tau.pro
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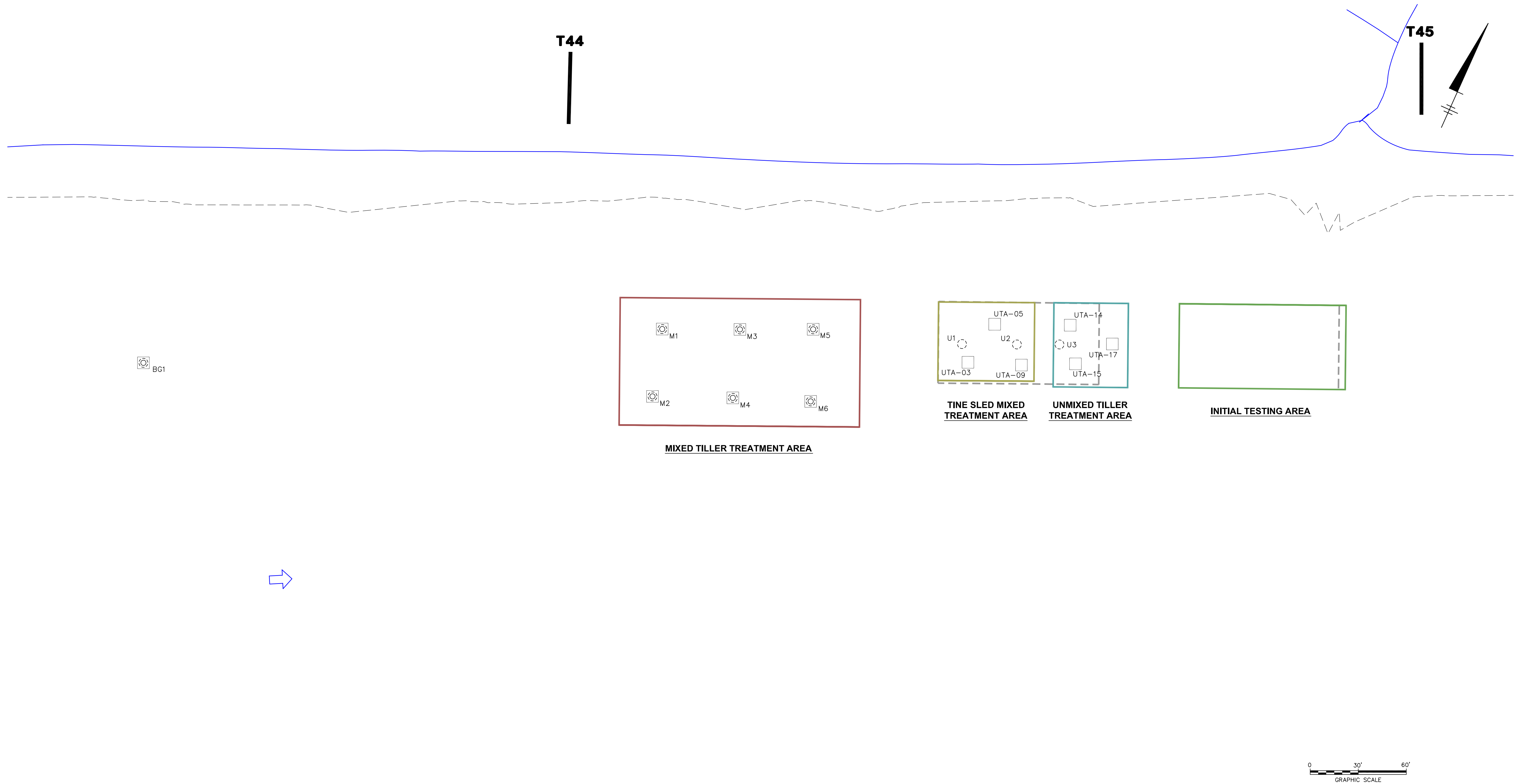


LEGEND:

T45	1992 SEDIMENT PROBING TRANSECT
	RIVER BOUNDARY
	NEAR SHORE AREA BOUNDARY
U2	BENTHIC INVERTEBRATE COMMUNITY SAMPLING LOCATION
M1	IN-SITU BIOLOGICAL SAMPLING LOCATIONS
UTA-17	EX-SITU BIOLOGICAL BULK SEDIMENT SAMPLING LOCATIONS
	FLOW DIRECTION
	TARGET INITIAL TESTING AREA
	TARGET MIXED TILLER TREATMENT AREA
	TARGET UNMIXED TILLER TREATMENT AREA
	TARGET TINE SLED MIXED TREATMENT AREA
	ORIGINAL UNMIXED TREATMENT AND INITIAL TESTING AREA BOUNDARIES

NOTE:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

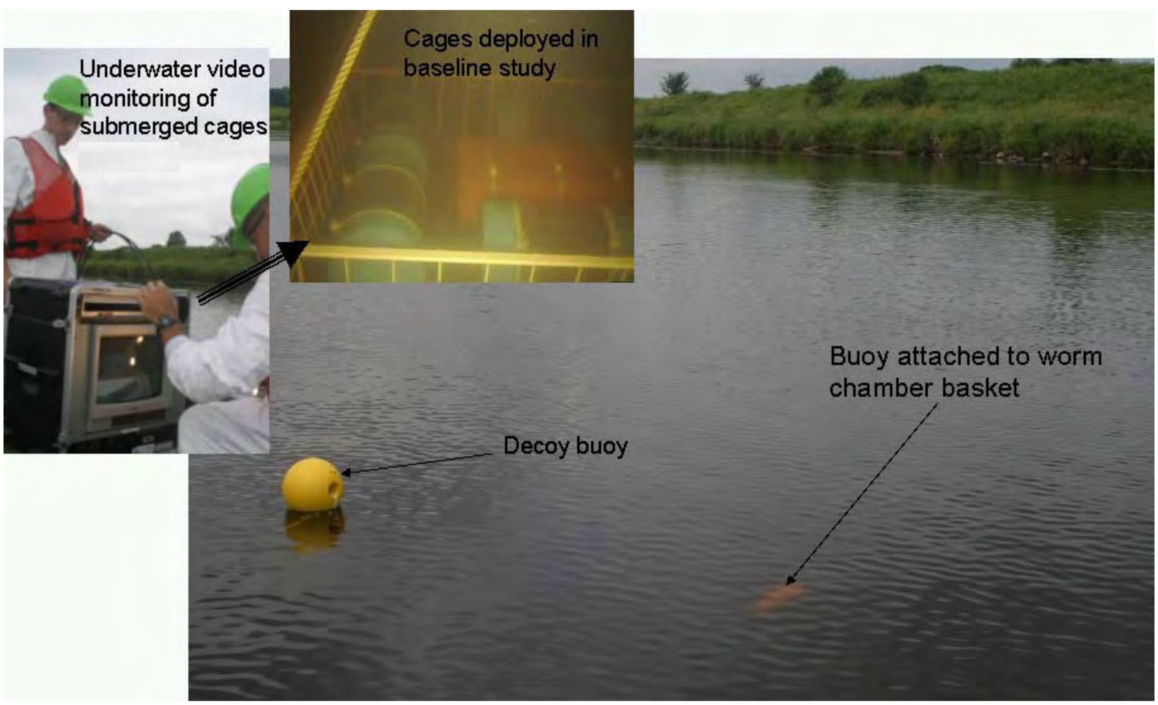
ACTIVATED CARBON PILOT STUDY CONSTRUCTION DOCUMENTATION REPORT

BENTHIC INVERTEBRATE COMMUNITY AND BIOLOGICAL SAMPLING LOCATIONS

ALCOA

FIGURE
A-5

In-River Deployment of Field Exposure Cages for Baseline Study



Buoy Deployment for Field Exposure Cages

[Note: The worm cage baskets are deployed with a decoy buoy attached to a brick and a submerged buoy (barely visible) attached to the worm chamber basket. Underwater video monitoring of the deployed cages confirmed the correct placement of the cages on the sediments.]

Figure A-6. In-Situ PCB Biouptake Studies – Field Deployment

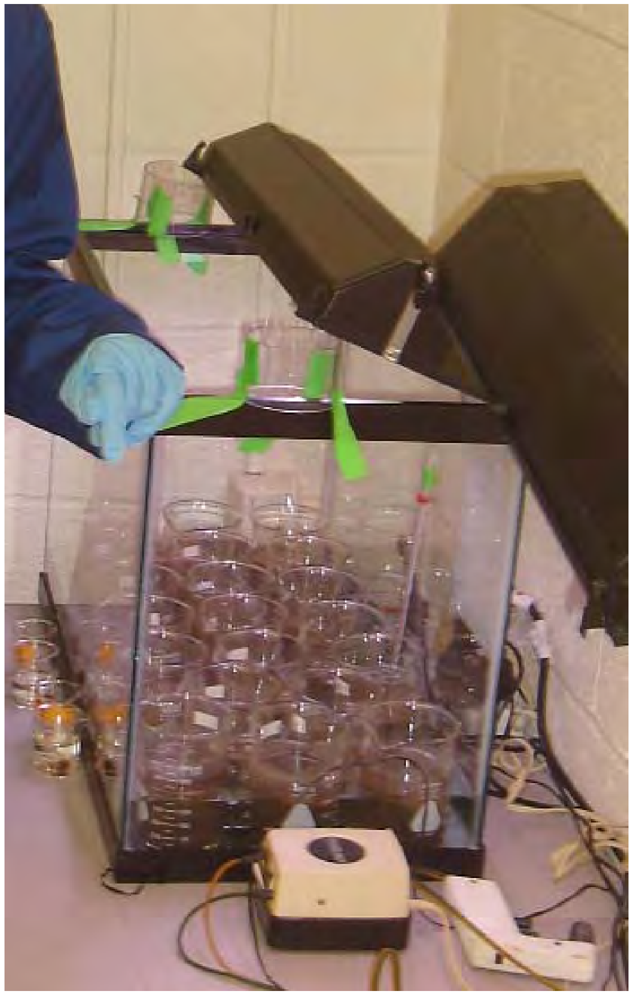
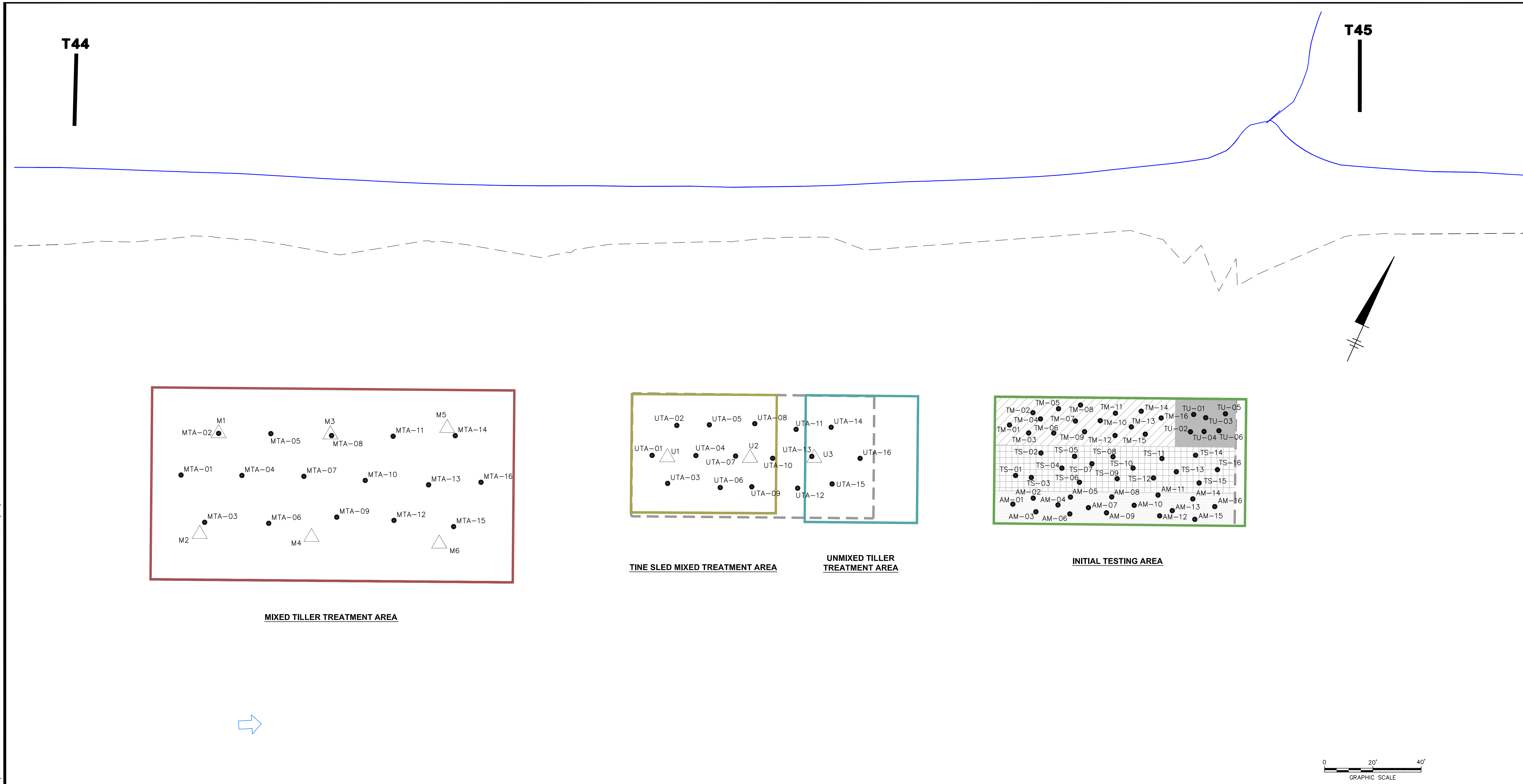


Figure A-7. **Laboratory Exposure Test with *Lumbriculus variegatus***



LEGEND:

T45	1992 SEDIMENT PROBING TRANSECT
	RIVER BOUNDARY
	NEAR SHORE AREA BOUNDARY
M2	BASELINE SEDIMENT CORE COLLECTION LOCATION (BLACK CARBON [BC-C], MICROSCOPY, AND PCB ANALYSIS)
MTA-09	BASELINE SEDIMENT VERIFICATION CORE COLLECTION LOCATION (TOC, BULK DENSITY, PERCENT MOISTURE, AND BLACK CARBON [BC-T] ANALYSIS)
	FLOW DIRECTION
	TARGET INITIAL TESTING AREA
	TARGET MIXED TILLER TREATMENT AREA
	TARGET UNMIXED TILLER TREATMENT AREA
	TARGET TINE SLED MIXED TREATMENT AREA
	ORIGINAL UNMIXED TREATMENT AND INITIAL TESTING AREA BOUNDARIES
	MIXED TILLER (INITIAL TESTING AREA)
	UNMIXED TILLER (INITIAL TESTING AREA)
	TINE SLED MIXED (INITIAL TESTING AREA)
	ADDITIONAL TESTING (INITIAL TESTING AREA)

NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
2. BASELINE SEDIMENT SAMPLES IN THE INITIAL TESTING AREA ALL HAVE THE PREFIX "TEST-" AND FOR CLARITY IN THE FIGURE THIS WAS OMITTED (I.E., THE SAMPLE ID FOR AM-01 IS TEST-AM-01).

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
ACTIVATED CARBON PILOT STUDY
CONSTRUCTION DOCUMENTATION REPORT

BASELINE SEDIMENT SAMPLING LOCATIONS

ALCOA

FIGURE
A-8

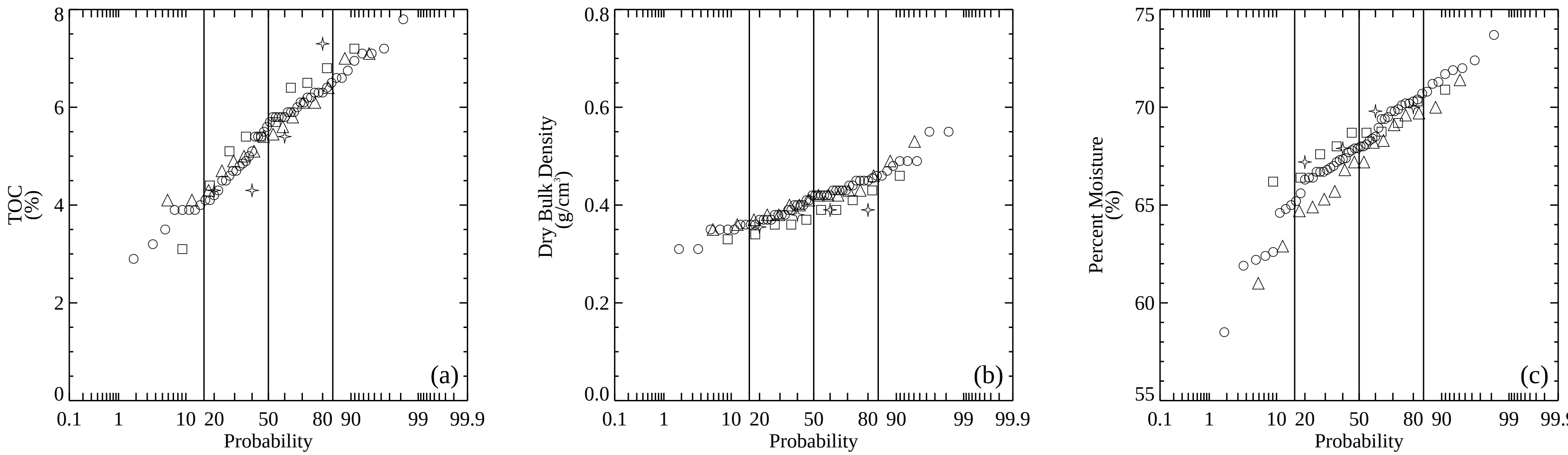


Figure A-9. TOC, Dry Bulk Density and Percent Moisture Distributions in Surface Sediment Samples Collected During Baseline Monitoring

Duplicates are averaged.

Baseline data based on samples collected 9/12-9/14/06 from the ACPS areas.

Data table: sed_aro_ACPS

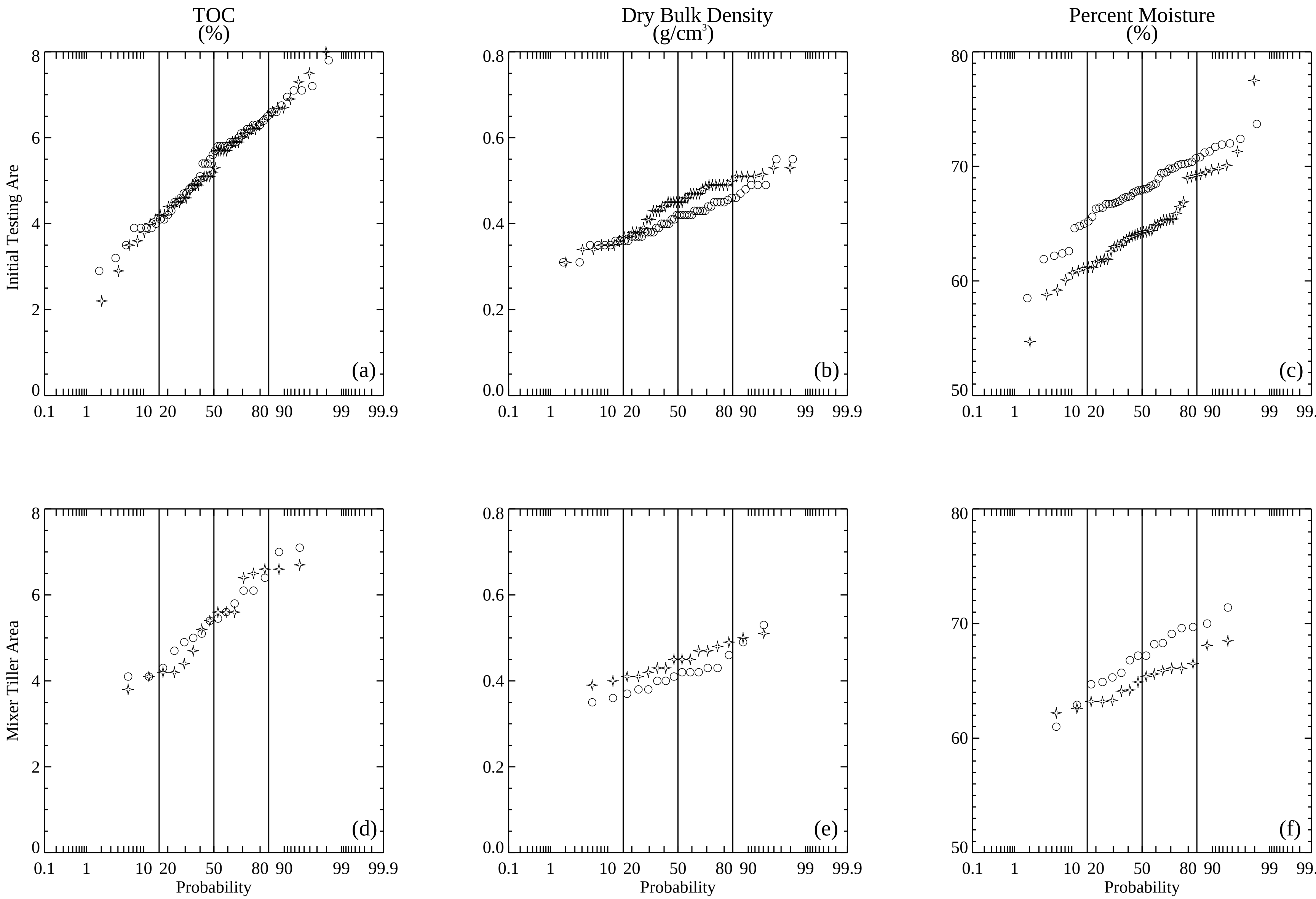


Figure A-10. Comparison of Sediment Characteristics (0-3" vs 3-6") in Sediment Samples Collected from the Initial Testing and Mixed Tiller Treatment Areas During Baseline Monitoring

Duplicates are averaged.

Baseline data based on samples collected 9/12-9/14/06 from the ACPS areas.

Data table: sed_aro_ACPS

ARC - \\Adrianne\D_DRIVE\ALCgra\Analysis\ACPS\IDL\TOC\Baseline\ph2_baseline_toc_byarea_032907.pro
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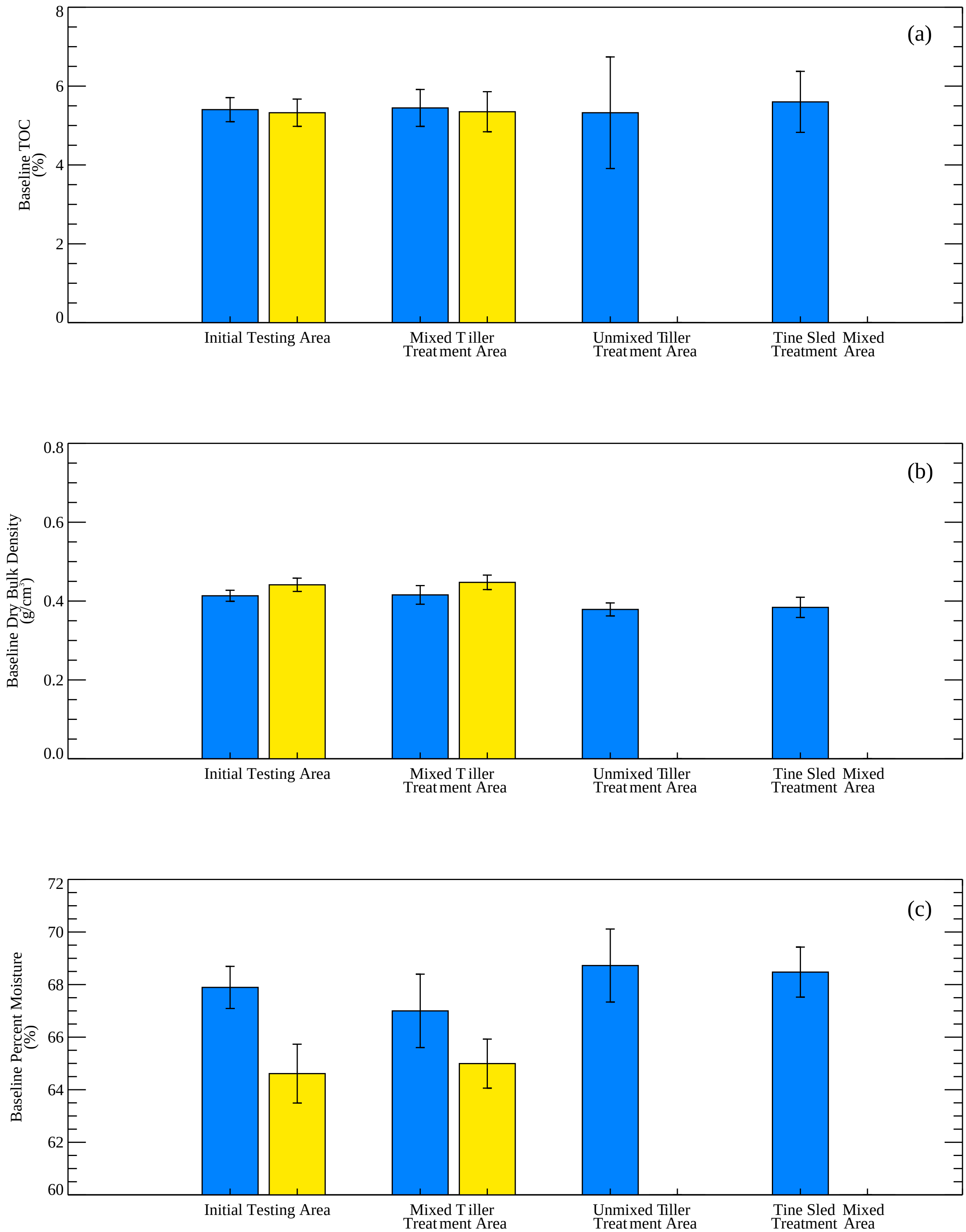

Figure A-11. Pre-Application TOC, Dry Bulk Density, and Percent Moisture Levels in the ACPS Areas

Duplicates are averaged.

Error bars represent +/- 2 standard errors.

0 - 3 inches
3 - 6 inches

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\Baseline\ph2_baseline_toc_byarea.pro
Mon Apr 09 15:13:18 2007

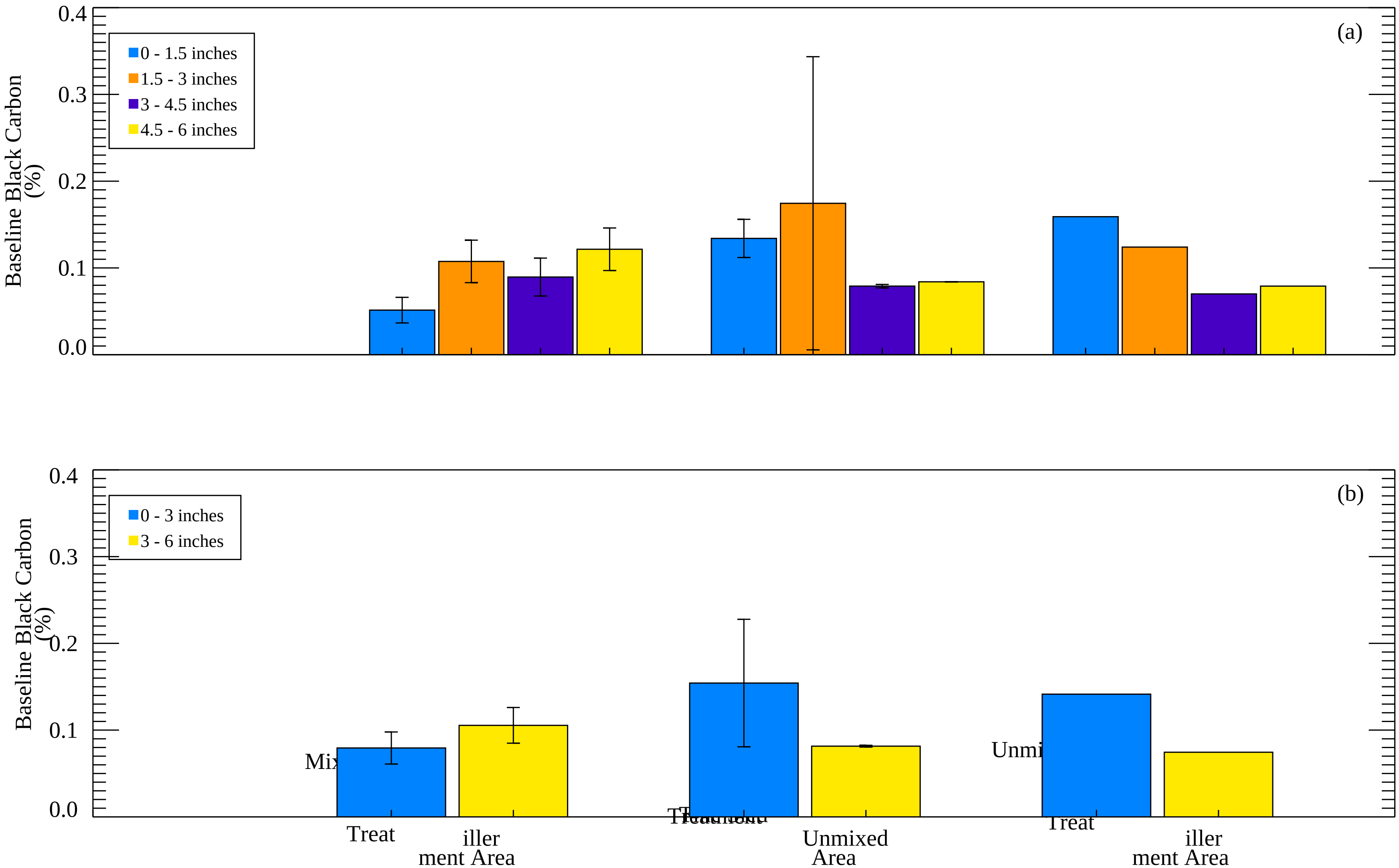

Figure A-12. Pre-Application Black Carbon (BC-C) Levels in the ACPS Areas
Black carbon results from UMBC based on black carbon-chemical preoxidation method (BC-C).
Error bars represent +/- 2 standard errors.

Data table: sed_aro_ACPS

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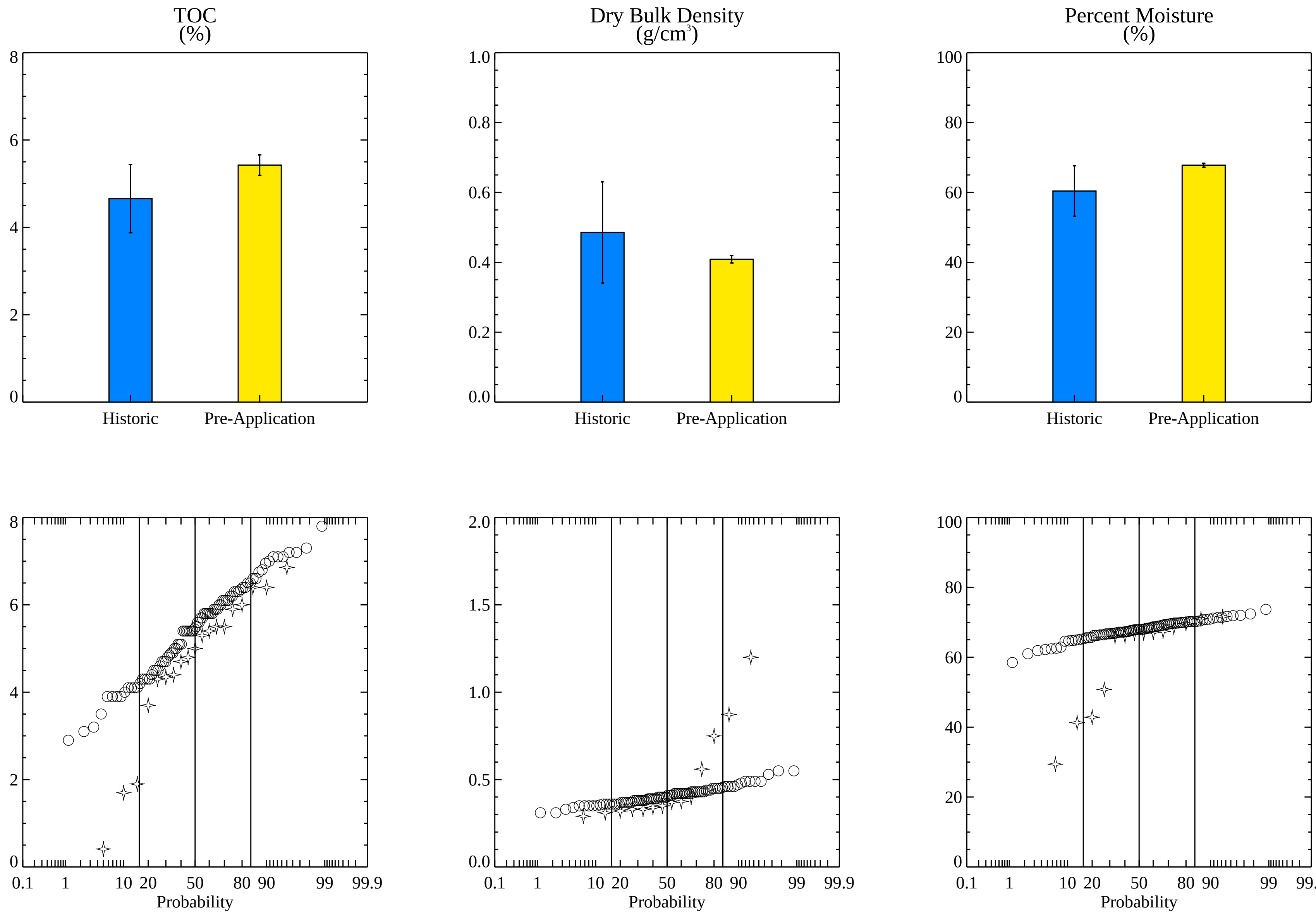


Figure A-13. Comparison of Historic and Pre-Application Surface Sediment Characteristics in the ACPS Area

Pre-Application ACPS data based on cores collected 9/12-9/14/06 in the ACPS area.

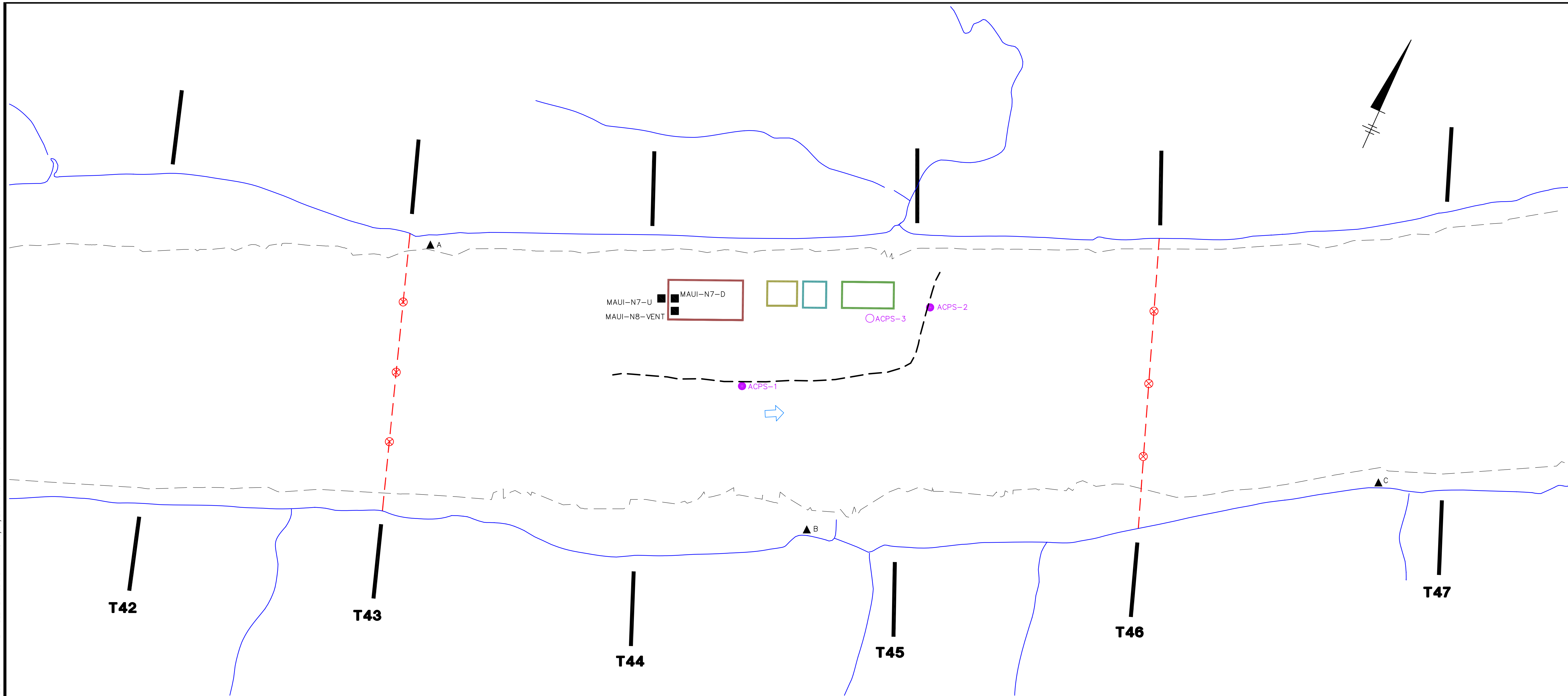
Historic sediment data based on cores collected 1991-2004 from T43 - T46.

Duplicates are averaged.

Data table: sediment_aro, sed_aro_ACPS

Historic
Pre-Application

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\Baseline\ACPS_TOC_vsHist.pro
Mon Apr 09 15:33:29 2007



LEGEND:

- T45 — 1992 SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- APPROXIMATE SILT CURTAIN LOCATION
- ROUTINE WATER COLUMN MONITORING TRANSECT (FIXED)
- ACPS–1 — ROUTINE LOCAL PERIMETER WATER COLUMN MONITORING LOCATION (FIXED)
- ACPS–3 — ROUTINE LOCAL INTERIOR WATER COLUMN MONITORING LOCATION (MOBILE LOCATION)
- MAUI–N7–U — SUPPLEMENTAL WATER COLUMN MONITORING LOCATION
- A — APPROXIMATE NOISE MONITORING LOCATION
- FLOW DIRECTION
- TARGET INITIAL TESTING AREA
- TARGET MIXED TILLER TREATMENT AREA
- TARGET UNMIXED TILLER TREATMENT AREA
- TARGET TINE SLED MIXED TREATMENT AREA

NOTE:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

0 100' 200'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY CONSTRUCTION DOCUMENTATION REPORT

WATER COLUMN AND NOISE MONITORING LOCATIONS

ALCOA

FIGURE

A-14

SYR–85–KMD GMS KLS LAYER: ON=*, OFF=*REF*, |CONT–HGH, |CONT–NML, |CONT–TEXT, |LTP100, |PT–ELEV, |PT–TICK
G:\CAD\ACTIVE\–DWG\ACT\10811002\10811C06.DWG SAVED:10/30/2007 7:53 AM LAYOUT:DL PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:10/30/2007 7:53 AM BY:KSARTORI
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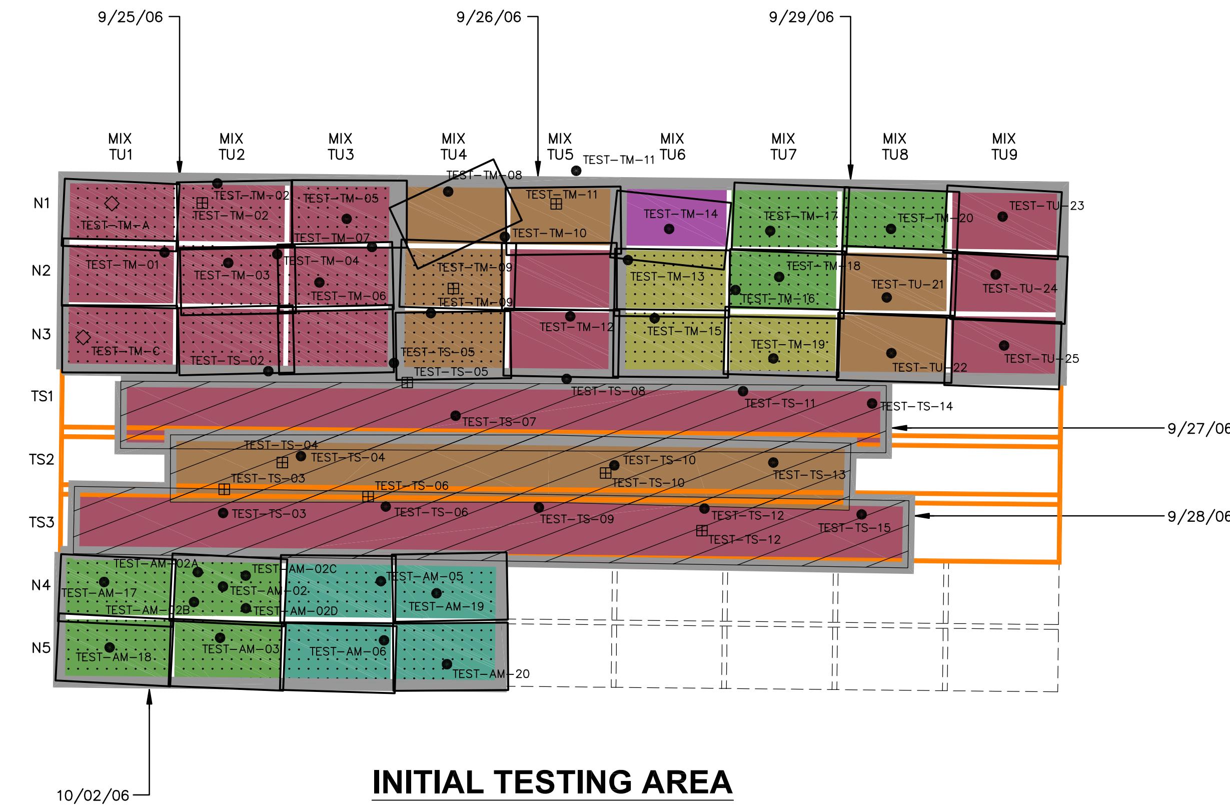
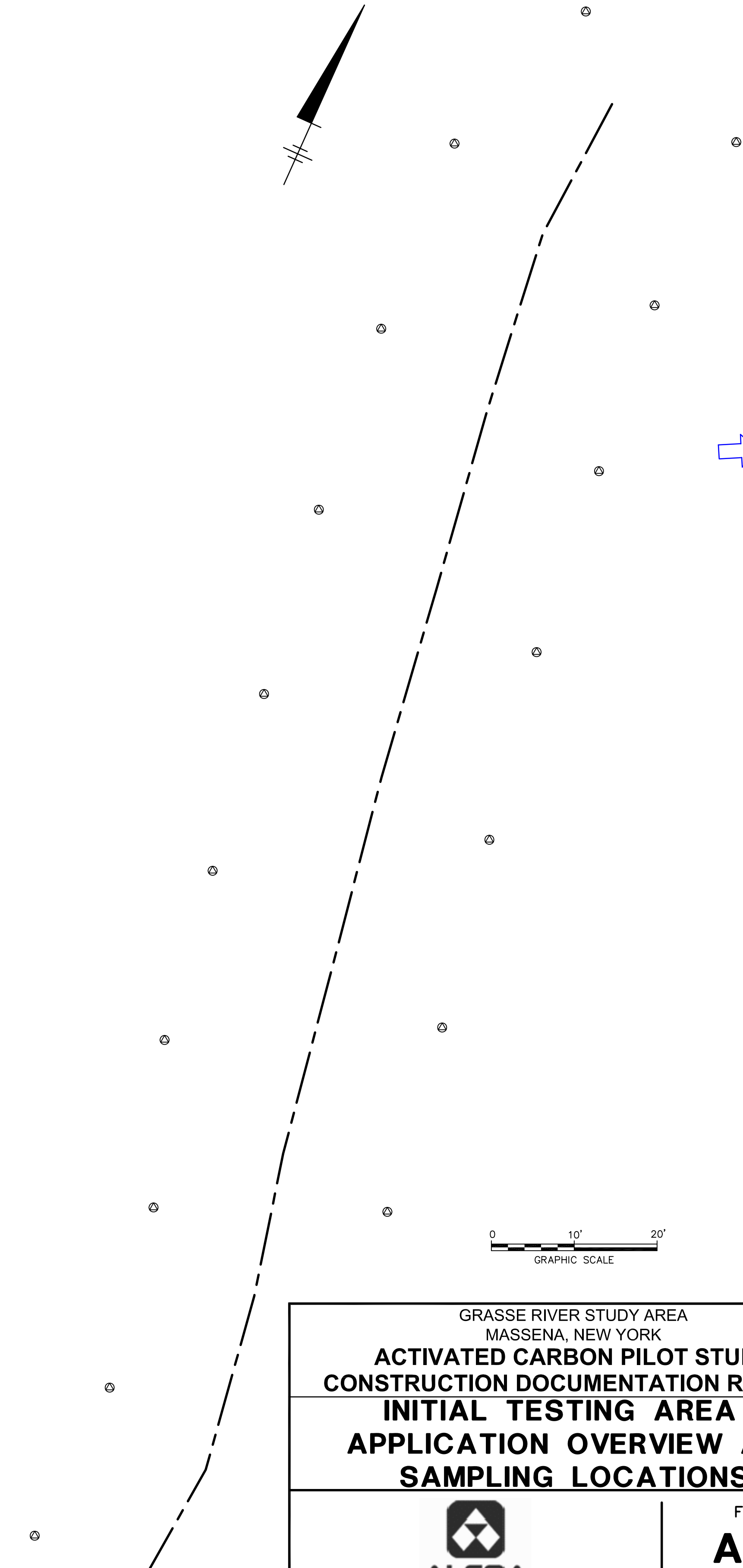


INITIAL TESTING AREA



TARGET APPLICATION CELLS/LANES:

- NO CARBON PLACED
- 1x CARBON DOSE, MIXED TILLER
- 2x CARBON DOSE, MIXED TILLER
- 1x CARBON DOSE, MIXED TILLER, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE
- 2x CARBON DOSE, MIXED TILLER, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE
- 2x CARBON DOSE, MIXED TILLER, 0.2 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE
- 1x CARBON DOSE, UNMIXED TILLER
- 2x CARBON DOSE, UNMIXED TILLER
- 1x CARBON DOSE, UNMIXED TILLER, 1.5 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE
- 1x CARBON DOSE, TINE SLED, 10 FEET/MINUTE
- 2x CARBON DOSE, TINE SLED, 5 FEET/MINUTE
- TARGET TINE SLED LANE

LEGEND:

- APPROXIMATE SILT CURTAIN LOCATION
- SILT CURTAIN ANCHOR LOCATION
- TEST–TM–11 ● SEDIMENT CORE LOCATION (COLLECTED FIRST)
- TEST–TM–11 ⊞ SEDIMENT CORE LOCATION (COLLECTED SECOND)
- TEST–TM–A ◇ VISUAL OBSERVATION SEDIMENT CORE LOCATION
- DAILY APPLICATION AREA OUTLINE
- ACTUAL TILLER APPLICATION CELL
- FLOW DIRECTION

NOTES:

1. THE TARGET AND ACTUAL LOCATIONS OF THE TILLER PLACEMENT CELLS AND TINE SLED APPLICATION LANES WERE PROVIDED BY J.F. BRENNAN.
2. THE SINGLE TARGET DOSE OF CARBON (1x) WAS 2.5%; 2x CARBON DOSE IS EQUIVALENT TO A TARGET APPLICATION OF 5%.
3. BITUMINOUS BASED ACID–WASHED ACTIVATED CARBON WAS PLACED IN THIS AREA.
4. APPLICATION CELLS COMPLETED ON 9/25 AND 9/26/06 WERE COMPLETED PRIOR TO "CORRECTION" OF SEDIMENT SURFACE THAT ACCOUNTED FOR DIFFERENCES BETWEEN ACTUAL SEDIMENT SURFACE AND THE BASELINE BATHYMETRIC SURVEY.
5. SETTLING TIME FOR TILLER APPLICATION CELLS IN THIS AREA WAS APPROXIMATELY 10 MINUTES (± 2 MINUTES), EXCEPT FOR TU6–N3 (15 MINUTES) AND TU9–N2 (7 MINUTES).

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
ACTIVATED CARBON PILOT STUDY
CONSTRUCTION DOCUMENTATION REPORT

INITIAL TESTING AREA - APPLICATION OVERVIEW AND SAMPLING LOCATIONS

ALCOA

FIGURE
A-15

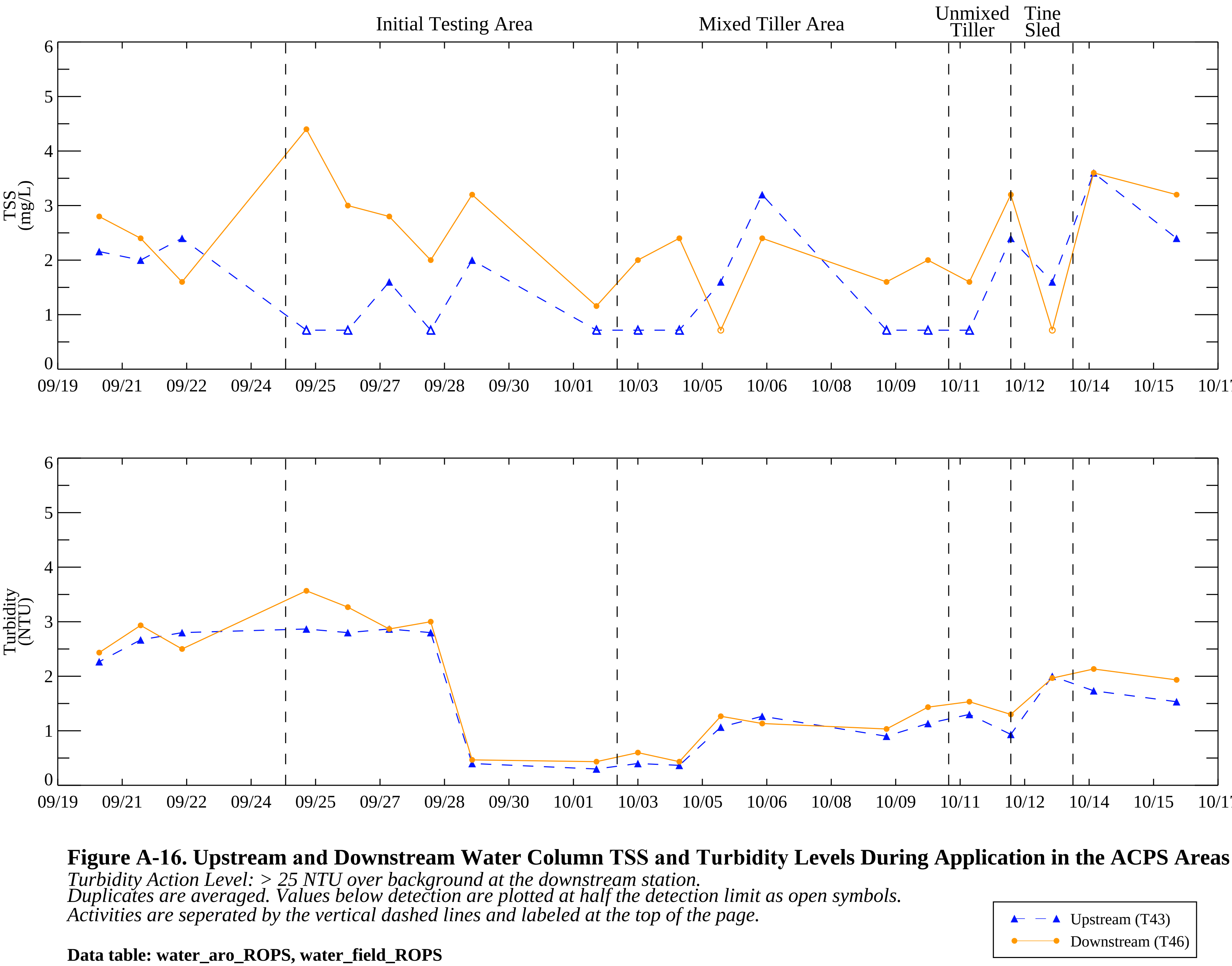


Figure A-16. Upstream and Downstream Water Column TSS and Turbidity Levels During Application in the ACPS Areas

Turbidity Action Level: > 25 NTU over background at the downstream station.
Duplicates are averaged. Values below detection are plotted at half the detection limit as open symbols.
Activities are seperated by the vertical dashed lines and labeled at the top of the page.

Data table: water_aro_ROPS, water_field_ROPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\water\ACPS_water_temporals.pro
Thu Nov 30 11:02:53 2006

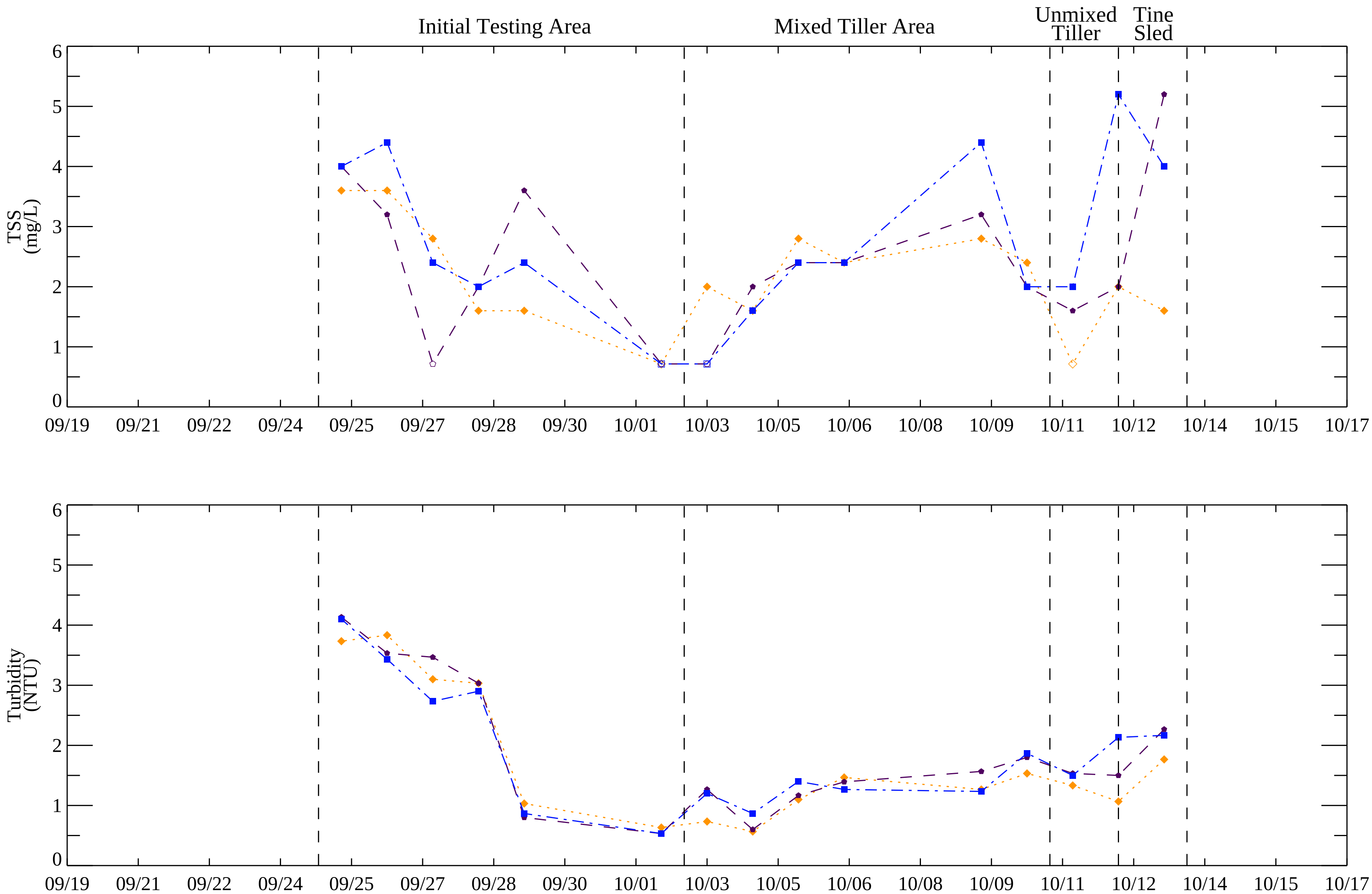


Figure A-17. Local Water Column TSS and Turbidity Levels During Application in the ACPS Areas

**Local station "ACPS-3" is located inside the silt curtain.*
Duplicates are averaged. Values below detection are plotted at half the detection limit as open symbols.
Activities are seperated by the vertical dashed lines and labeled at the top of the page.

Data table: water_aro_ROPS, water_field_ROPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\water\ACPS_water_temporals.pro
Thu Nov 30 11:02:53 2006

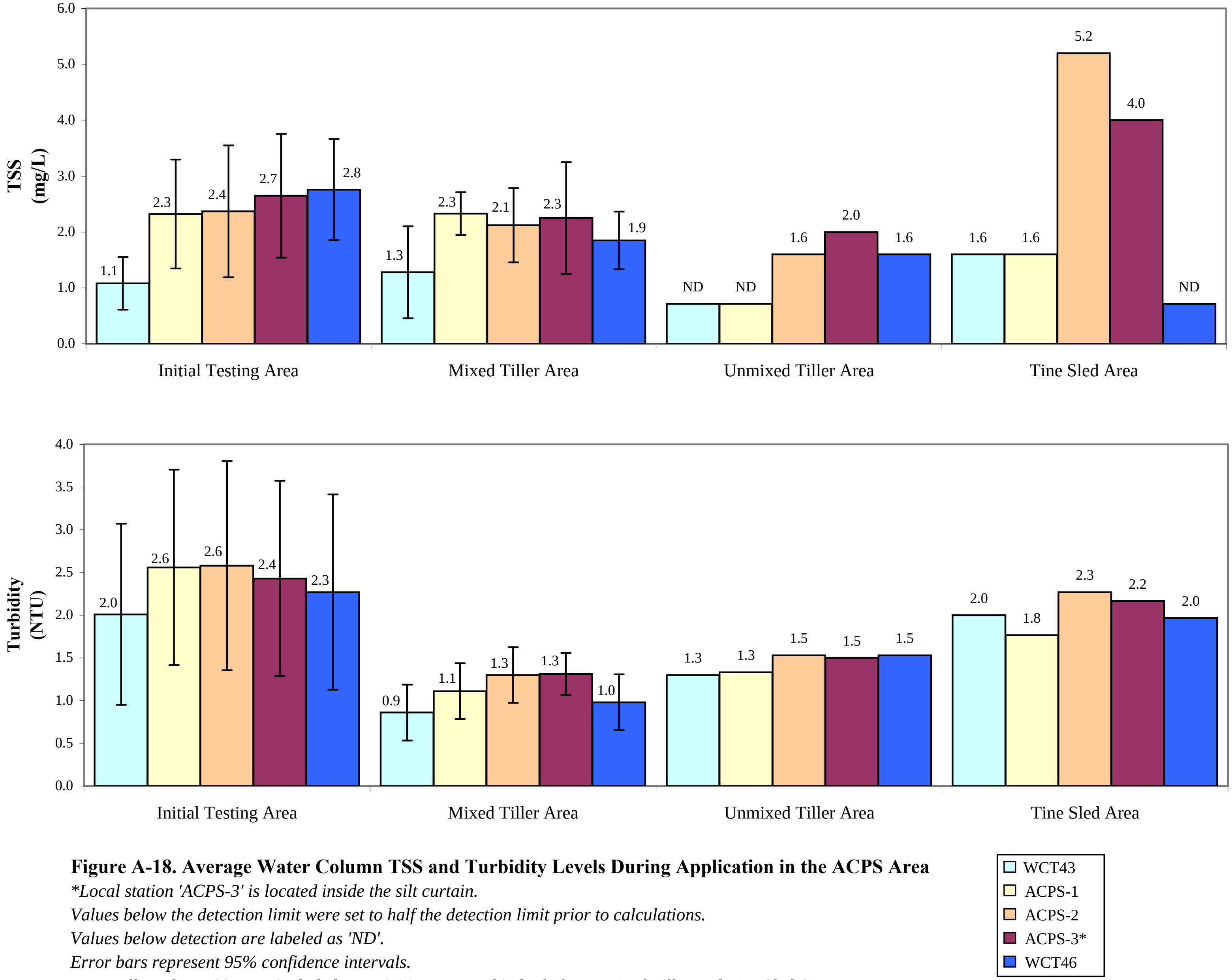


Figure A-18. Average Water Column TSS and Turbidity Levels During Application in the ACPS Area

**Local station 'ACPS-3' is located inside the silt curtain.*

Values below the detection limit were set to half the detection limit prior to calculations.

Values below detection are labeled as 'ND'.

Error bars represent 95% confidence intervals.

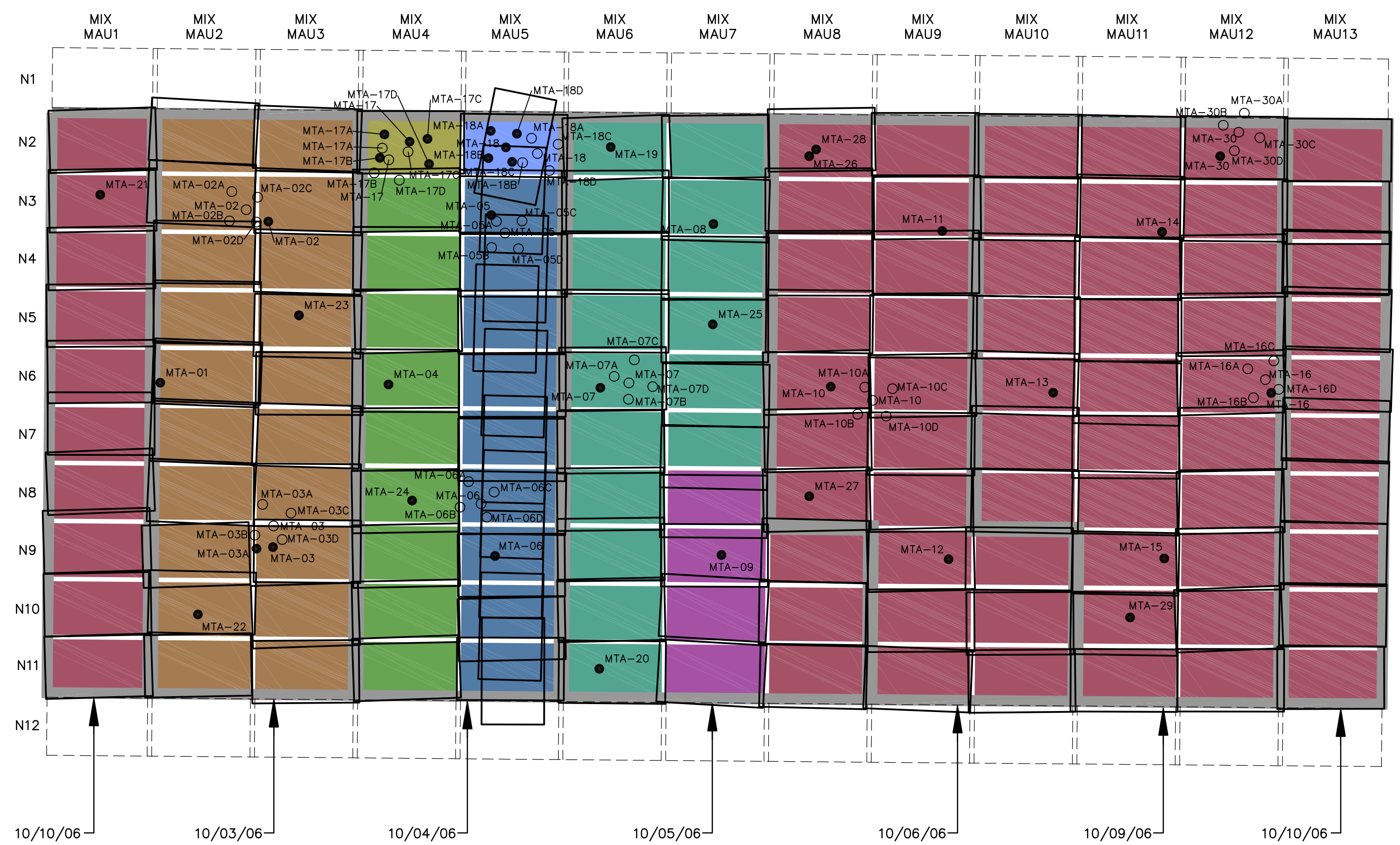
Data collected on 10/12 not included as activities occurred in both the Unmixed Tiller and Tine Sled Areas.

Date tables: water_aro_ACPS, water_field_ACPS

ARC- D:\ALCgra\Analysis\ACPS\IDL\water\watercolumn_spatialavg_barplots.xls
11/30/2006 11:14 AM

TARGET TILLER APPLICATION CELLS:

- NO CARBON PLACED
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 4 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 12 TO 15 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT > 12 TO 15 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 12 TO 15 RPM, 10 MINUTE SETTLING TIME, THEN ROTATED TILLER 90 DEGREES ON SAME FOOTPRINT AND REMIXED AT 12 TO 15 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 3 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT > 12 TO 15 RPM, 10 MINUTE SETTLING TIME, THEN ROTATED TILLER 90 DEGREES ON SAME FOOTPRINT AND REMIXED, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 3 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 15 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, MIXED TILLER AT 5 TO 7 RPM, 0.3 FEET ABOVE FIELD–CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME, INSPECTED NOZZLES EVERY 5 CELLS



MIXED TILLER TREATMENT AREA

LEGEND:

- ● MTA-03 SEDIMENT CORE LOCATION (SINGLE POINT)
- ○ MTA-03A SEDIMENT CORE LOCATION (5–POINT COMPOSITE; SEE NOTE 4)
- DAILY APPLICATION AREA OUTLINE
- ACTUAL TILLER APPLICATION CELL
- FLOW DIRECTION

NOTES:

1. THE TARGET AND ACTUAL LOCATIONS OF THE TILLER PLACEMENT CELLS WERE PROVIDED BY J.F. BRENNAN.
2. THE SINGLE TARGET DOSE OF CARBON (1x) WAS 2.5%; 1.5x CARBON DOSE IS EQUIVALENT TO A TARGET APPLICATION OF 3.75%.
3. BITUMINOUS BASED ACID–WASHED ACTIVATED CARBON WAS USED IN THIS APPLICATION AREA.
4. CORE LOCATIONS WITH THE SAME SAMPLE ID FOLLOWED BY A LETTER (A, B, C, D) WERE COMPOSITED BY DEPTH INTERVAL AND SUBMITTED FOR LABORATORY ANALYSIS (UNLESS OTHERWISE INDICATED).

0 10' 20'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
ACTIVATED CARBON PILOT STUDY
CONSTRUCTION DOCUMENTATION REPORT

MIXED TILLER TREATMENT AREA- APPLICATION OVERVIEW AND SAMPLING LOCATIONS

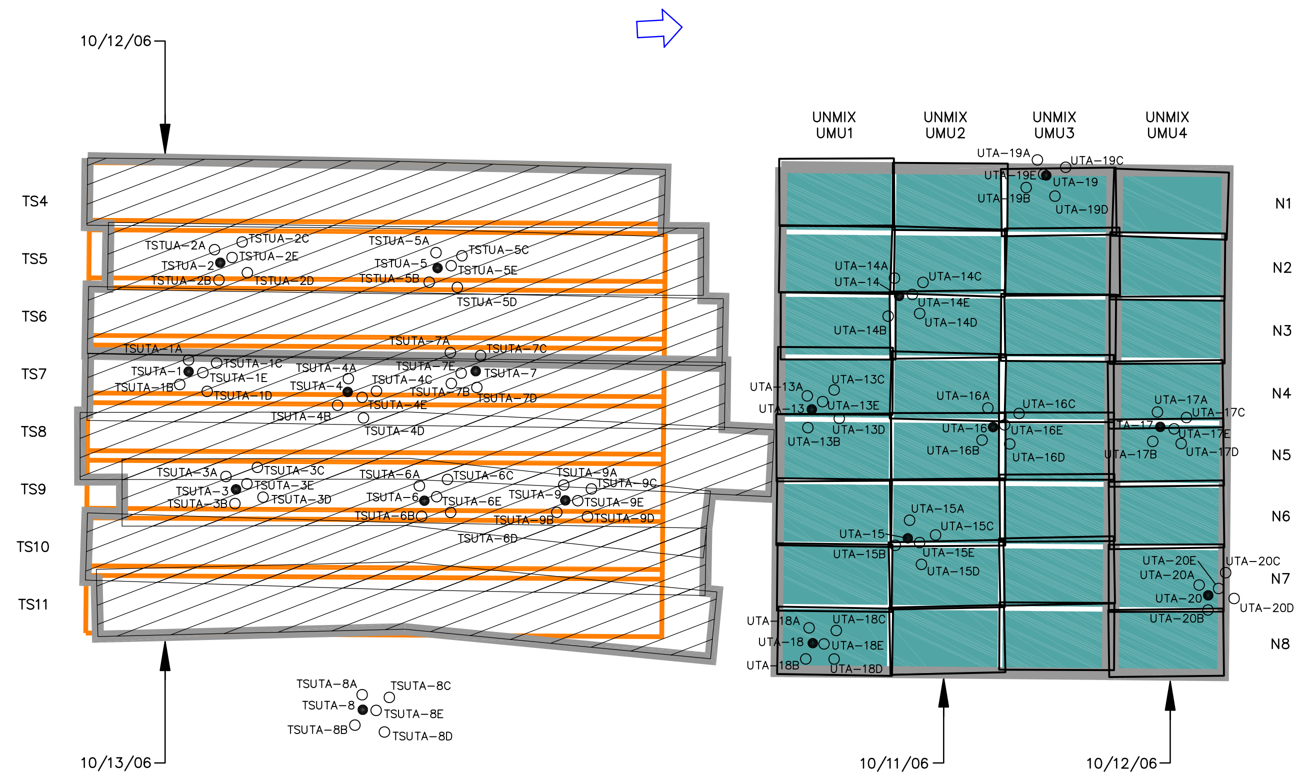
ALCOA

FIGURE
A-19

SYR-85-KMD GMS KLS LAYER: ON=*, OFF=REF
G:\CAD\ACTIVE\-DWG\ACT\10811001\10811C11.DWG SAVED:10/30/2007 8:03 AM LAYOUT:A-19 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:10/30/2007 8:03 AM BY:KSARTORI
PROJECTNAME:---- IMAGES: 10811X01.TIF
XREFS: 10811X00

TARGET APPLICATION CELLS/LANES:

- 1.5x CARBON DOSE, TILLER UNMIXED, 0.3 FEET ABOVE FIELD-CORRECTED SEDIMENT SURFACE, 10 MINUTE SETTLING TIME
- 1.5x CARBON DOSE, TINE SLED, 5 FEET/MINUTE



TINE SLED MIXED TREATMENT AREA

UNMIXED TILLER TREATMENT AREA

LEGEND:

- ● UTA-18 SEDIMENT CORE LOCATION (SINGLE POINT)
- ○ UTA-18A SEDIMENT CORE LOCATION (5-POINT COMPOSITE; SEE NOTE 4)
- DAILY APPLICATION AREA OUTLINE
- ACTUAL TILLER APPLICATION CELL
- TARGET TINE SLED LANE
- FLOW DIRECTION

NOTES:

1. THE TARGET AND ACTUAL LOCATIONS OF THE TILLER PLACEMENT CELLS AND TINE SLED APPLICATION LANES WERE PROVIDED BY J.F. BRENNAN.
2. THE SINGLE TARGET DOSE OF CARBON (1x) WAS 2.5%; 1.5x CARBON DOSE IS EQUIVALENT TO A TARGET APPLICATION OF 3.75%.
3. COCONUT SHELL-BASED ACTIVATED CARBON WAS USED IN THE TINE SLED MIXED AND UNMIXED TILLER TREATMENT AREAS.
4. CORE LOCATIONS WITH THE SAME SAMPLE ID FOLLOWED BY A LETTER (A, B, C, D, E) WERE COMPOSITED BY DEPTH INTERVAL AND SUBMITTED FOR LABORATORY ANALYSIS.

0 10' 20'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY CONSTRUCTION DOCUMENTATION REPORT

TINE SLED MIXED AND UNMIXED TILLER TREATMENT AREAS - APPLICATION OVERVIEW AND SAMPLING LOCATIONS

ALCOA

FIGURE
A-20

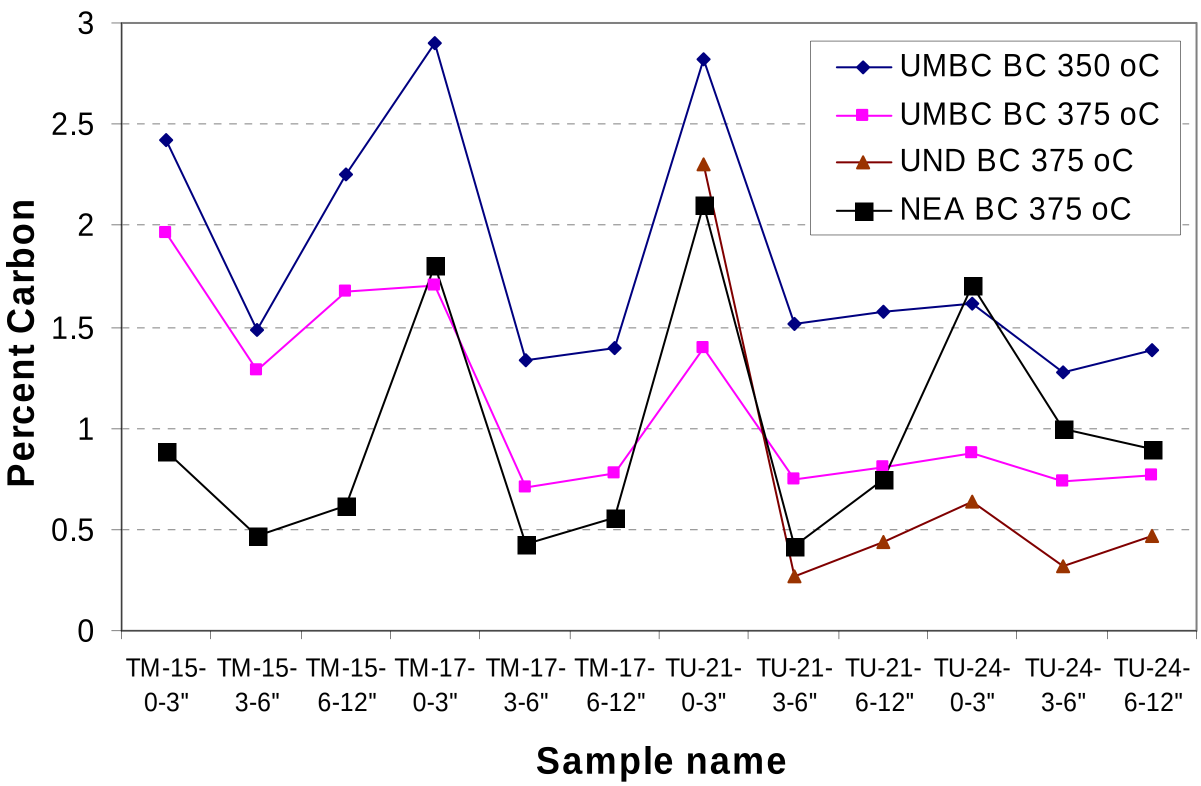


Figure A-21. Comparison of Black Carbon Results from Three Laboratories Using the 375 ^{o}C Pre-Combustion Treatment

Notes:

1. The UND data is for a 24 hour pre-combustion based on the original black carbon method. The use of a 350 ^{o}C pre-combustion treatment temperature increases the black carbon determination by nearly 2-fold.
2. NEA – Northeast Analytical Inc.; UMBC – University of Maryland Baltimore County; UND – University of North Dakota

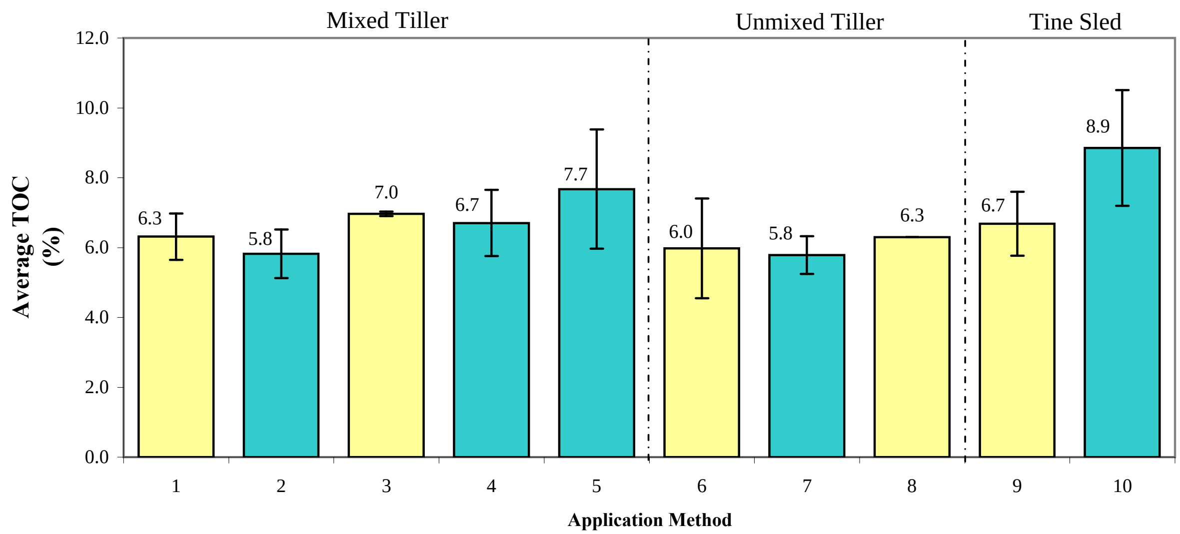


Figure A-22. Average Surface TOC by Operating Parameter in the Initial Testing Area

Duplicates are averaged. Error bars represent +/- 2 standard errors.
The dashed vertical lines represent a change in the equipment used.

Data table: sed_aro_ACPS

Operating Parameter Combination Description:

1. Mixed Tiller; Single Dose
2. Mixed Tiller; Double Dose
3. Mixed Tiller; Single Dose; 0.3 ft above field-corrected sediment bed
4. Mixed Tiller; Double Dose; 0.3 ft above field-corrected sediment bed
5. Mixed Tiller; Double Dose; 0.2 ft above field-corrected sediment bed
6. Unmixed Tiller; Single Dose
7. Unmixed Tiller; Double Dose
8. Unmixed Tiller; Single Dose; 1.5 ft above field-corrected sediment bed
9. Tine Sled; Single Dose; 10 ft/minute
10. Tine Sled; Double Dose; 5 ft/minute

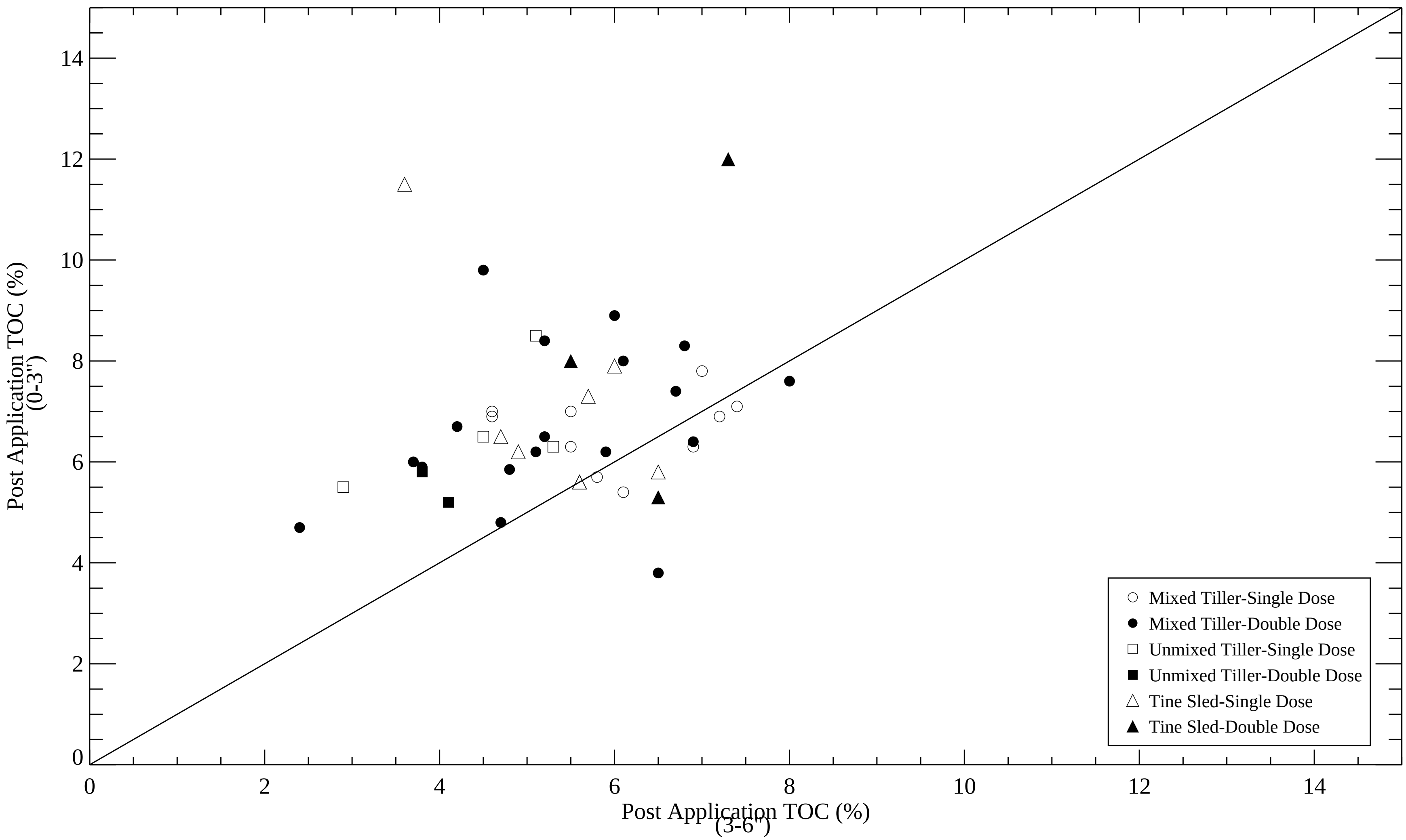


Figure A-23. Post-Application TOC Levels in Surface (0-3") and Subsurface (3-6") Samples from the Initial Testing Area

Duplicates are averaged.

Data table: sed_aro_ACPS

MS - \\Mindy\d_drive\ALCgra\Analysis\ac_comparison\xplot_posttoc.pro
Wed Dec 06 11:21:20 2006

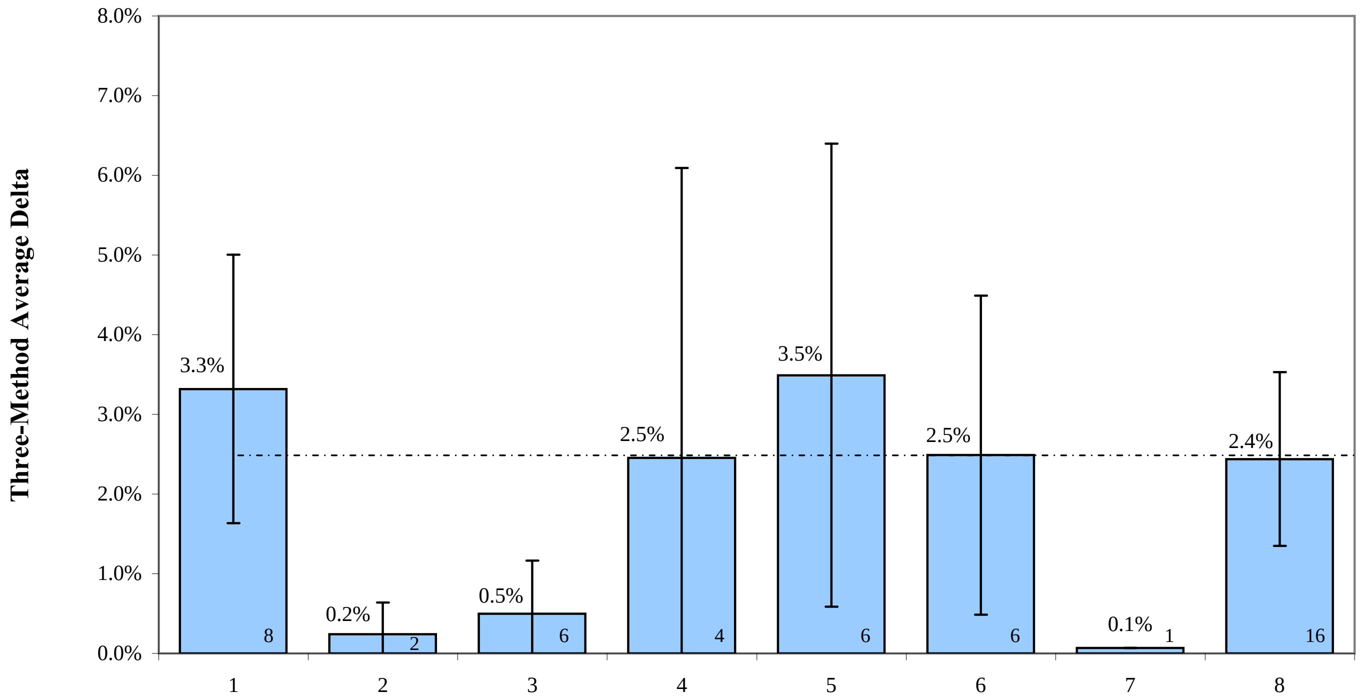


Figure A-24. TOC Increases by Operating Parameter in the Mixed Tiller Treatment Area

'Three-Method Average Delta' is used to estimate the amount of activated carbon added to the sediments.
Duplicates averaged prior to calculations. Error bars represent +/- 2 standard errors.
The dashed horizontal line represents the target carbon increase of 2.5%.
Sample counts listed at the base of each bar and include single-point and 5-point composite samples.
Data table: sed_aro_ACPS

Operating Parameter Combination Descriptions:

1. 1 1/2 Dose, Low RPM, 0.3 ft above sediment surface; 4 minute settling time
2. 1 1/2 Dose, 12-15 RPM, 0.3 ft above sediment surface, 10 minute settling time
3. 1 1/2 Dose, >12-15 RPM, 0.3 ft above sediment surface, 10 minute settling time
4. 1 1/2 Dose, 12-15 RPM, 10 minute settling time then rotated 90 degrees and remixed at 12-15 RPM, 0.3 ft above sediment surface, 3 minute settling time
5. 1 1/2 Dose, >12-15 RPM, 10 minute settling time then rotated 90 degrees and remixed at 12-15 RPM, 0.3 ft above sediment surface, 3 minute settling time
6. 1 1/2 Dose, 5-7 RPM, 0.3 ft above sediment surface; 10 minute settling time
7. 1 1/2 Dose, 5-7 RPM, 0.3 ft above sediment surface; 15 minute settling time
8. 1 1/2 Dose, 5-7 RPM, 0.3 ft above sediment surface; 10 minute settling time, Inspected nozzles every 5 setups

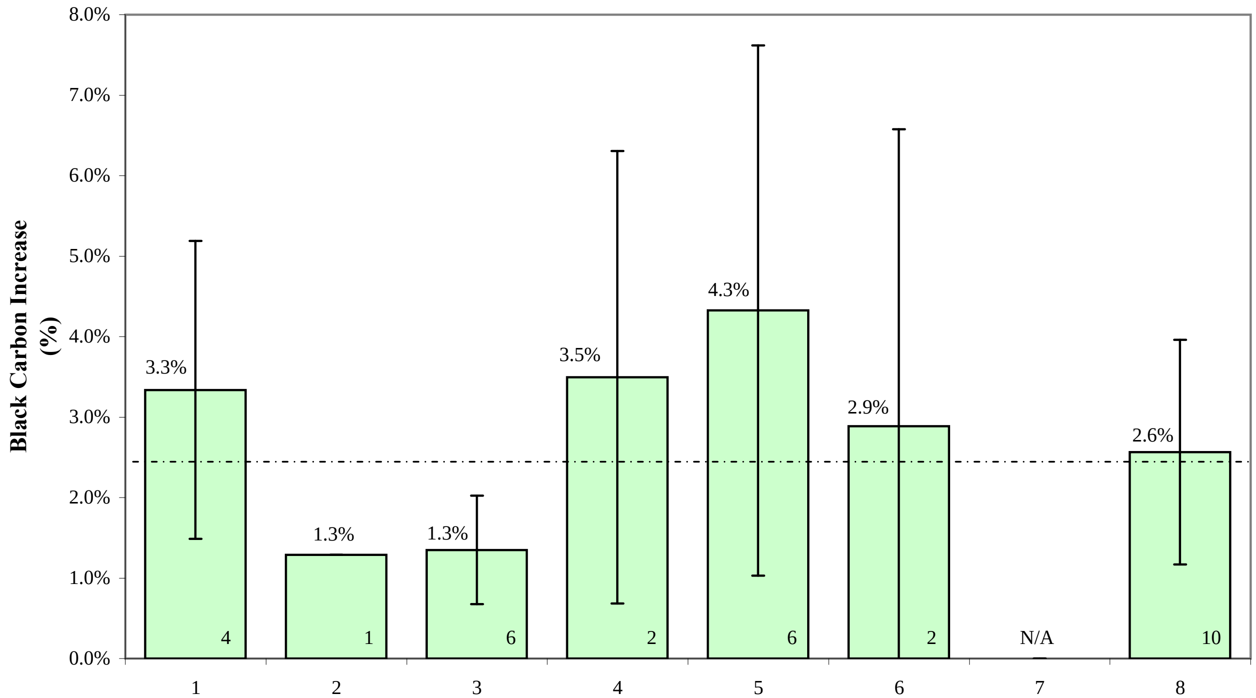


Figure A-25. Increase in Black Carbon (BC-C) by Operating Parameter in the Mixed Tiller Treatment Area

Increase in black carbon is based on black carbon-chemical preoxidation analysis of surface (0-3") sediments.
Duplicates averaged prior to calculations. Error bars represent +/- 2 standard errors.
The dashed horizontal line represents the target carbon increase of 2.5%.
Sample counts listed at the base of each bar and include single-point and 5-point composite samples. 'N/A' = not available
Data table: sed_aro_ACPS

Operating Parameter Combination Descriptions:

1. 1 1/2 Dose, Low RPM, 0.3 ft above sediment surface; 4 minute settling time
2. 1 1/2 Dose, 12-15 RPM, 0.3 ft above sediment surface, 10 minute settling time
3. 1 1/2 Dose, >12-15 RPM, 0.3 ft above sediment surface, 10 minute settling time
4. 1 1/2 Dose, 12-15 RPM, 10 minute settling time then rotated 90 degrees and remixed at 12-15 RPM, 0.3 ft above sediment surface, 3 minute settling time
5. 1 1/2 Dose, >12-15 RPM, 10 minute settling time then rotated 90 degrees and remixed at 12-15 RPM, 0.3 ft above sediment surface, 3 minute settling time
6. 1 1/2 Dose, 5-7 RPM, 0.3 ft above sediment surface; 10 minute settling time
7. 1 1/2 Dose, 5-7 RPM, 0.3 ft above sediment surface; 15 minute settling time
8. 1 1/2 Dose, 5-7 RPM, 0.3 ft above sediment surface; 10 minute settling time, Inspected nozzles every 5 setups

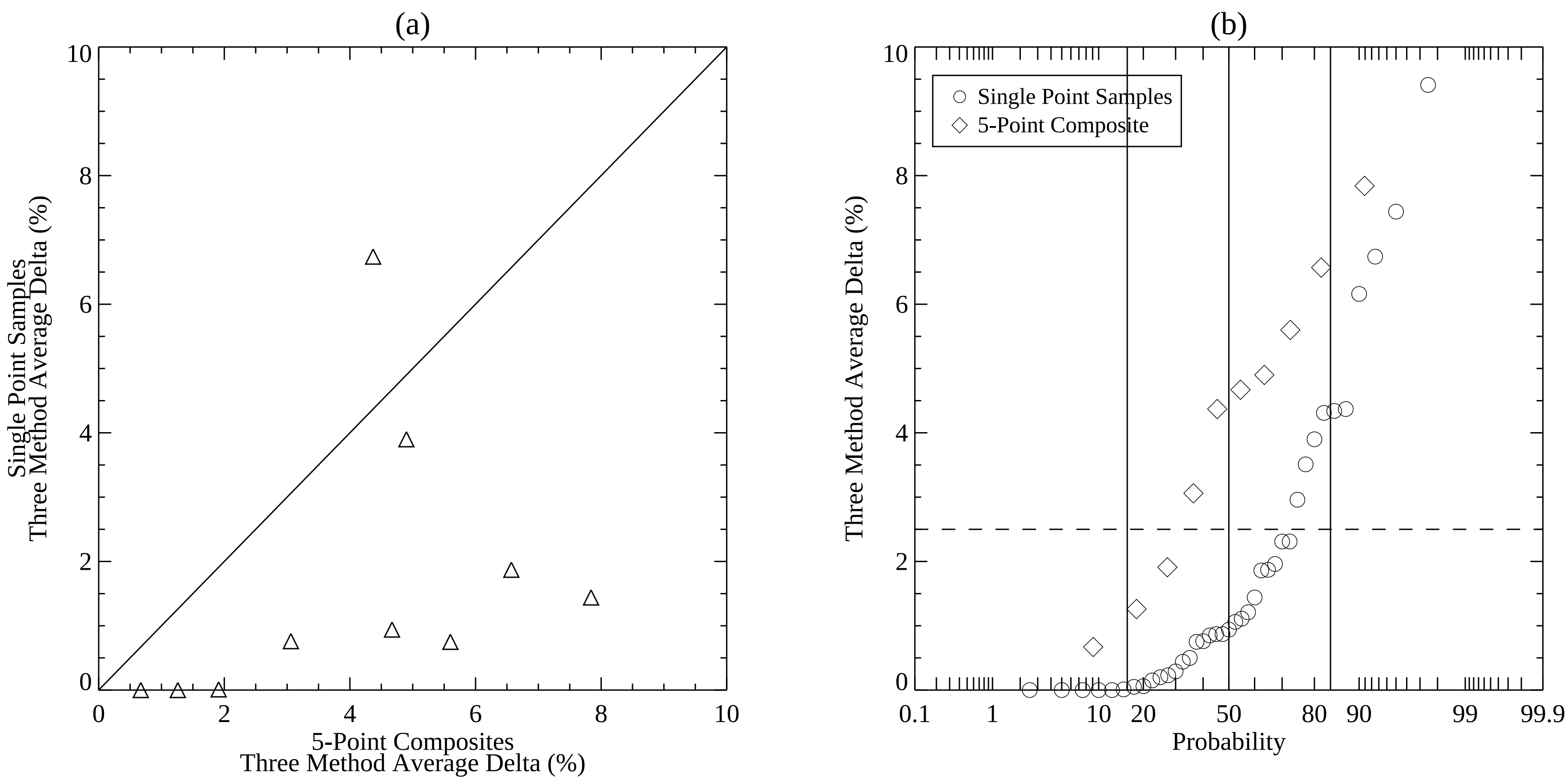


Figure A-26. TOC Increase based on Three Method Avgerage Delta for Single Point and 5-Point Composite Samples from the Mixed Tiller Treatment Area

Three method average is an estimate of the amount of activated carbon applied to the sediment.
The dashed horizontal line represents the target carbon increase (2.5%).

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_3MethAvg_SinglevsComp.pro
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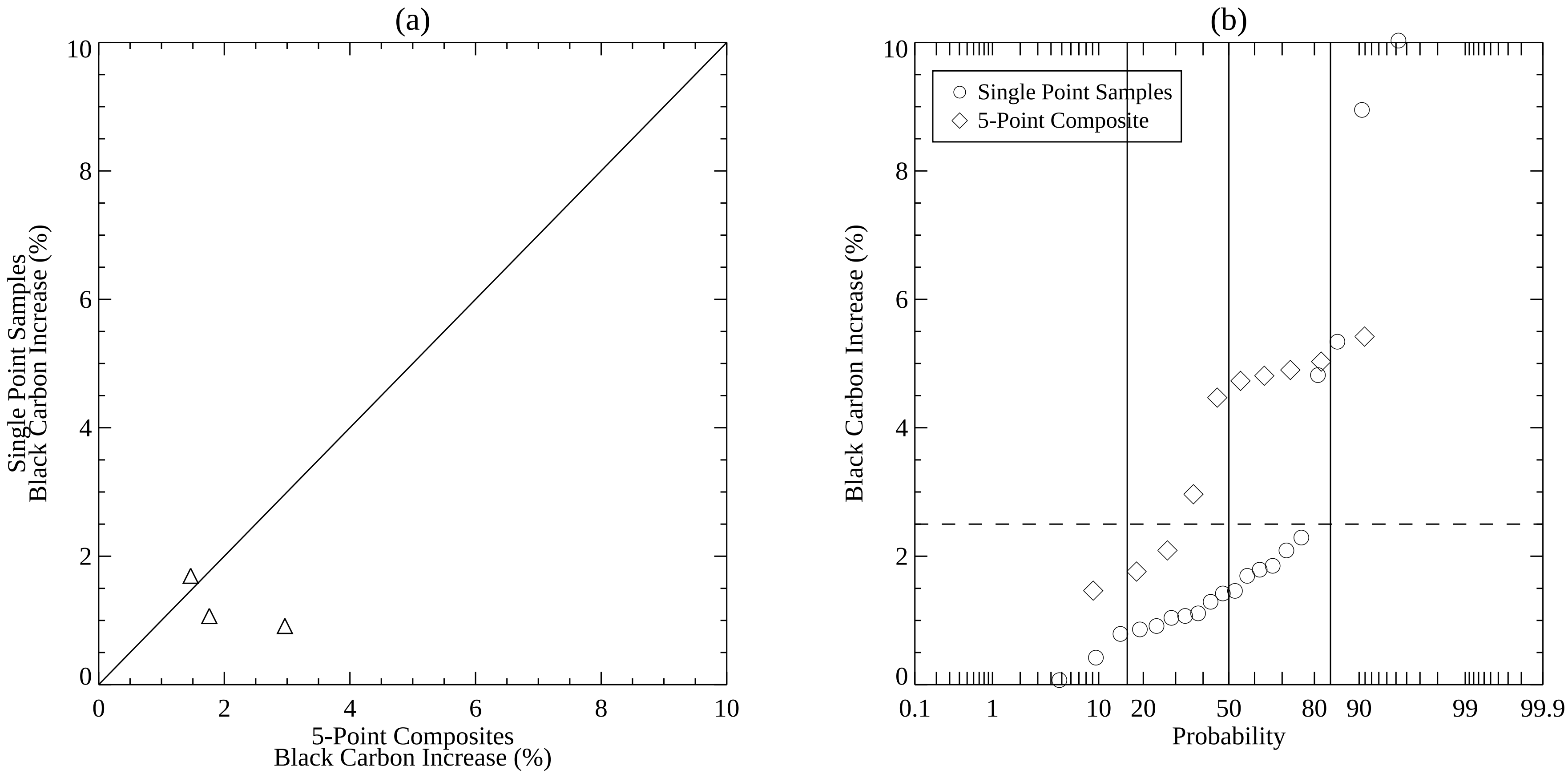

Figure A-27. Black Carbon (BC-C) Increase in Single Point and 5-Point Composite Samples - Mixed Tiller Treatment Area

Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C).
The dashed horizontal line represents the target carbon increase (2.5%).

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_3MethAvg_SinglevsComp.pro
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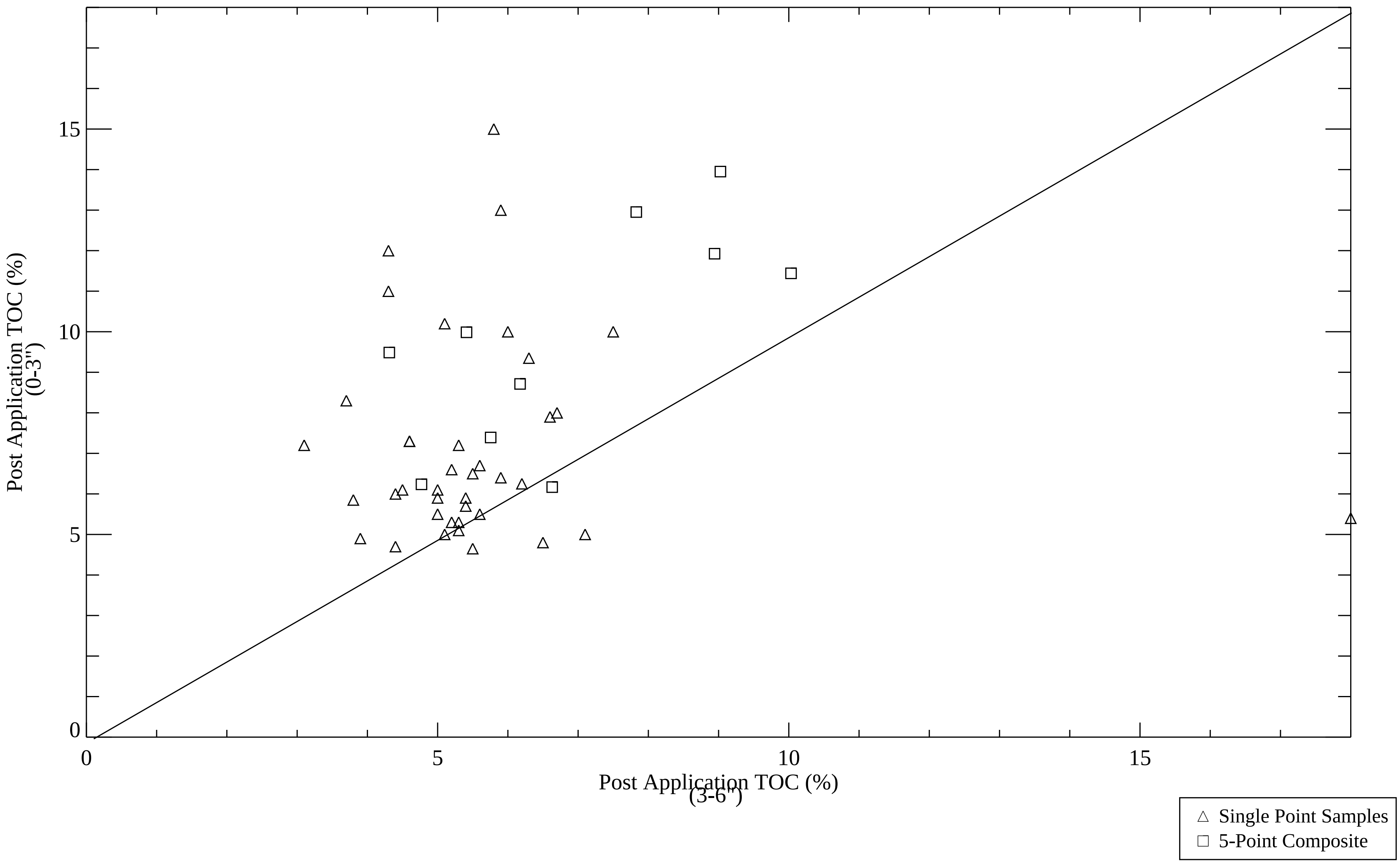


Figure A-28. Post-Application TOC Levels in Surface (0-3") and Subsurface (3-6") Samples from the Mixed Tiller Treatment Area

Duplicates are averaged.

Data table: sed_aro_ACPS

MS - \\Mindy\d_drive\ALCgra\Analysis\ac_comparison\xplot_posttoc.pro
Wed Dec 06 11:21:20 2006

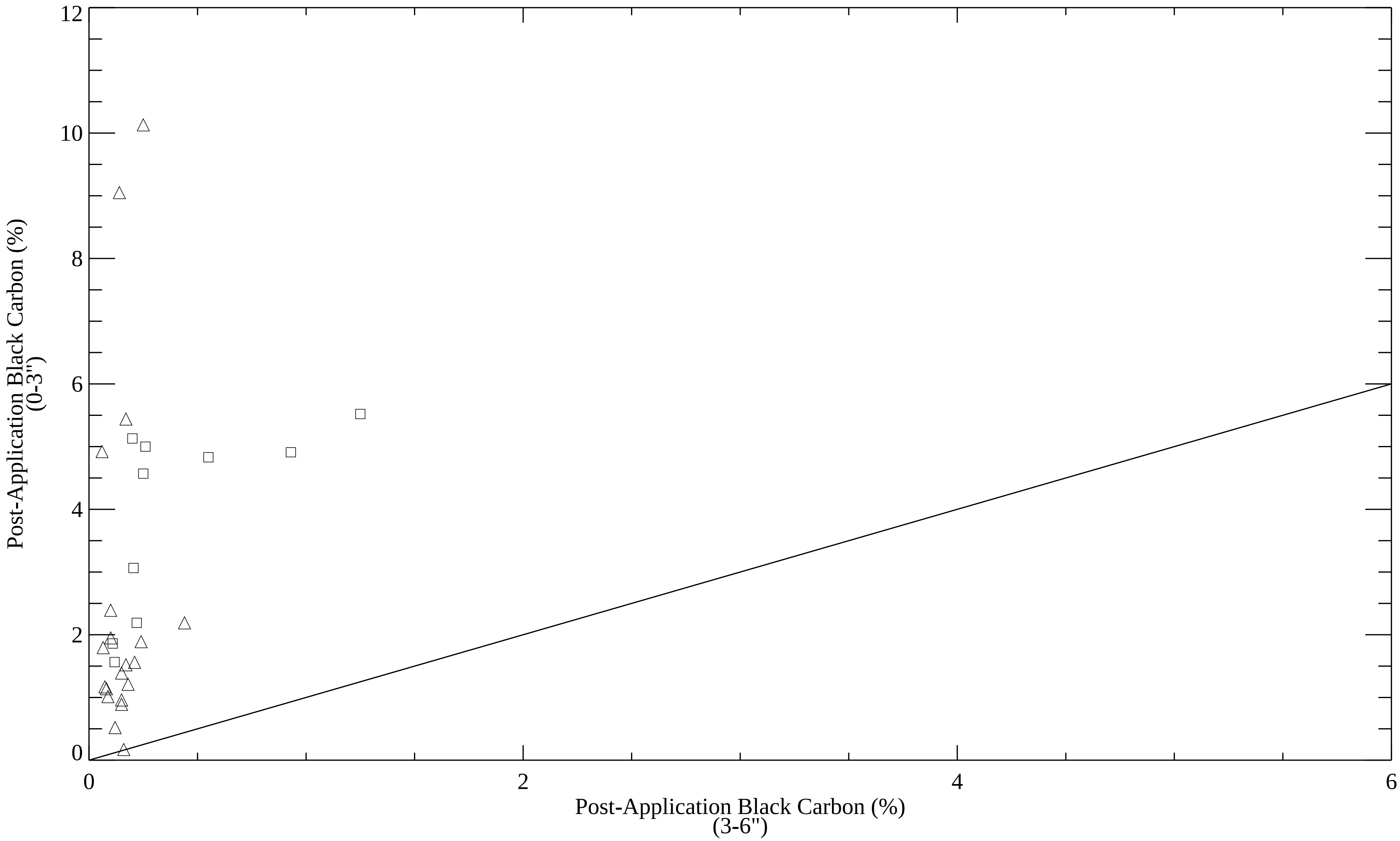


Figure A-29. Black Carbon (BC-C) Levels in Surface (0-3") and Subsurface (3-6") Samples from the Mixed Tiller Treatment Area

X-axis adjusted to represent difference in data range.

Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C). Duplicates are averaged.

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_1to1_SinglevsComp.pro
Wed Apr 04 10:28:37 2007

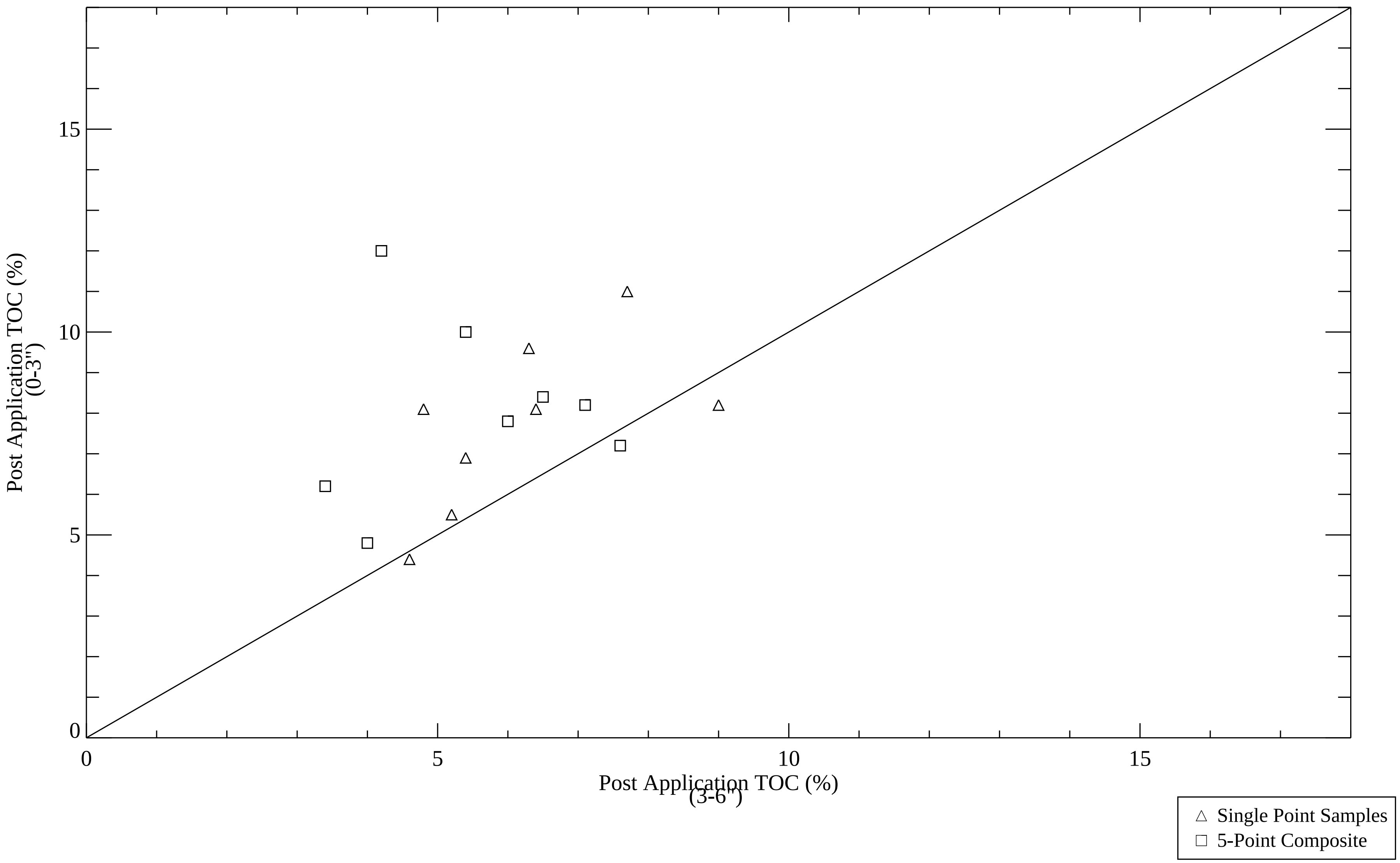


Figure A-30. Post-Application TOC Levels in Surface (0-3") and Subsurface (3-6") Samples from the Tine Sled Mixed Treatment Area

Duplicates are averaged.
Data from location "TSUTA-8" is excluded as samples were collected from outside the application area.

Data table: sed_aro_ACPS

MS - \\Mindy\d_drive\ALCgra\Analysis\ac_comparison\xplot_posttoc.pro
Wed Dec 06 11:21:20 2006

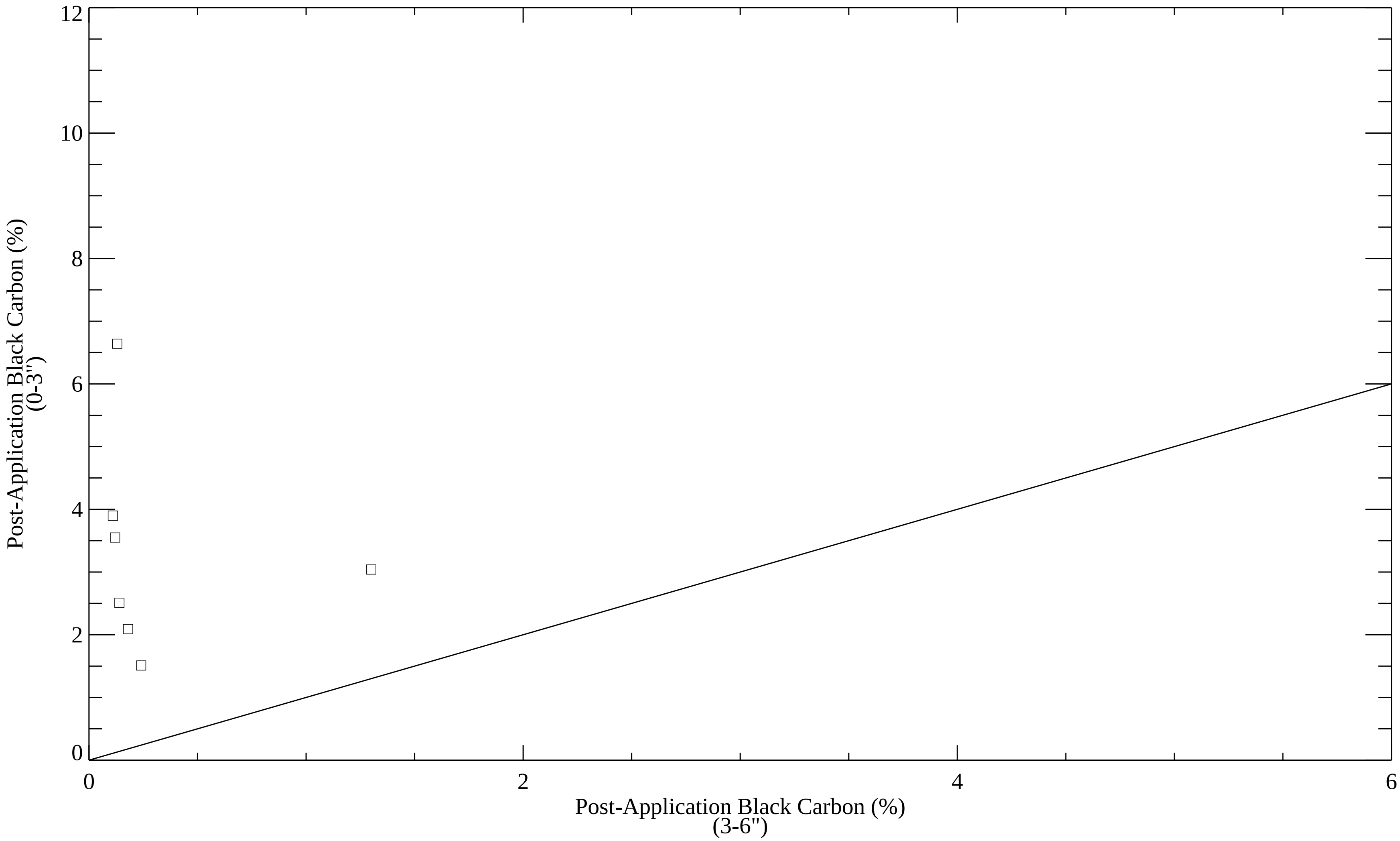


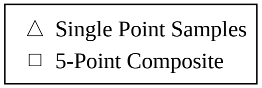
Figure A-31. Black Carbon (BC-C) Levels in Surface (0-3") and Subsurface (3-6") Samples from the Tine Sled Mixed Treatment Area

X-axis adjusted to represent difference in data range.

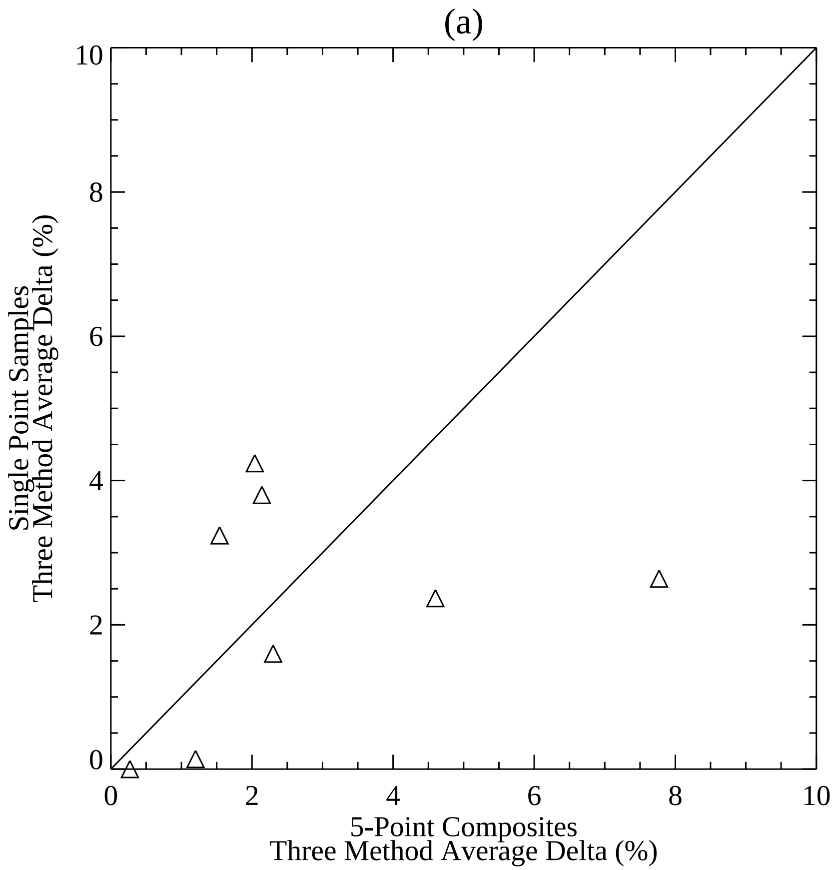
Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C). Duplicates are averaged.

Data from location "TSUTA-8" is excluded as samples were collected from outside the application area.

Data table: sed_aro_ACPS



ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_1to1_SinglevsComp.pro
Wed Apr 04 10:28:37 2007



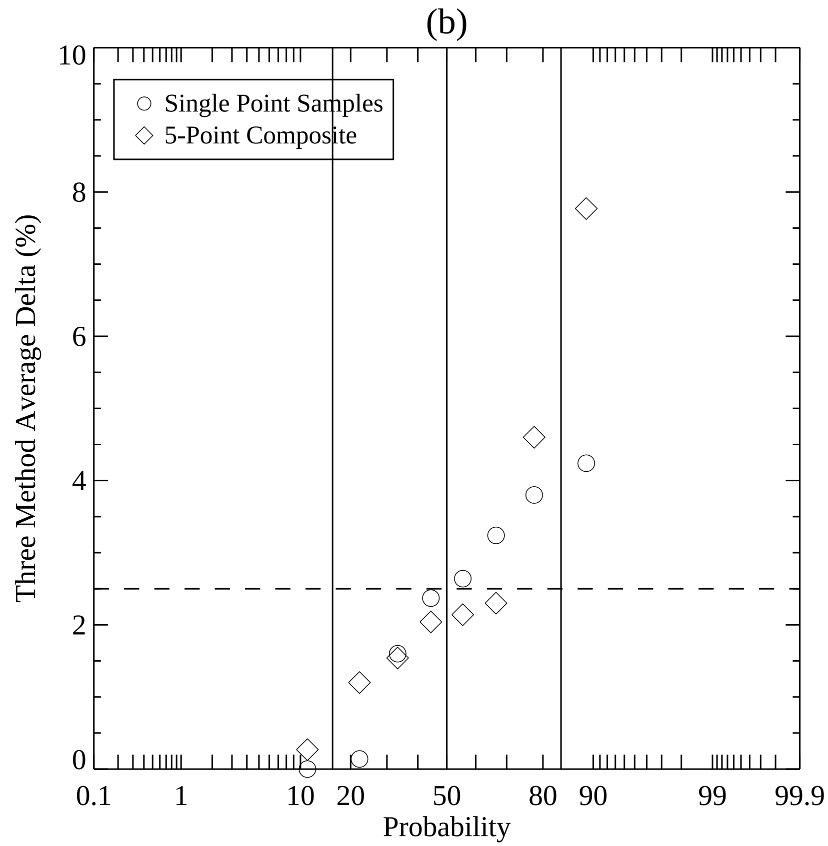


Figure A-32. TOC Increase based on Three Method Avgerage Delta for Single Point and 5-Point Composite Samples from the Tine Sled Mixed Treatment Area

Three method average is an estimate of the amount of activated carbon applied to the sediment.
The dashed horizontal line represents the target carbon increase (2.5%).
Data from location "TSUTA-8" is excluded as samples were collected from outside the application area.

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_3MethAvg_SinglevsComp.pro
Wed Apr 25 14:45:22 2007

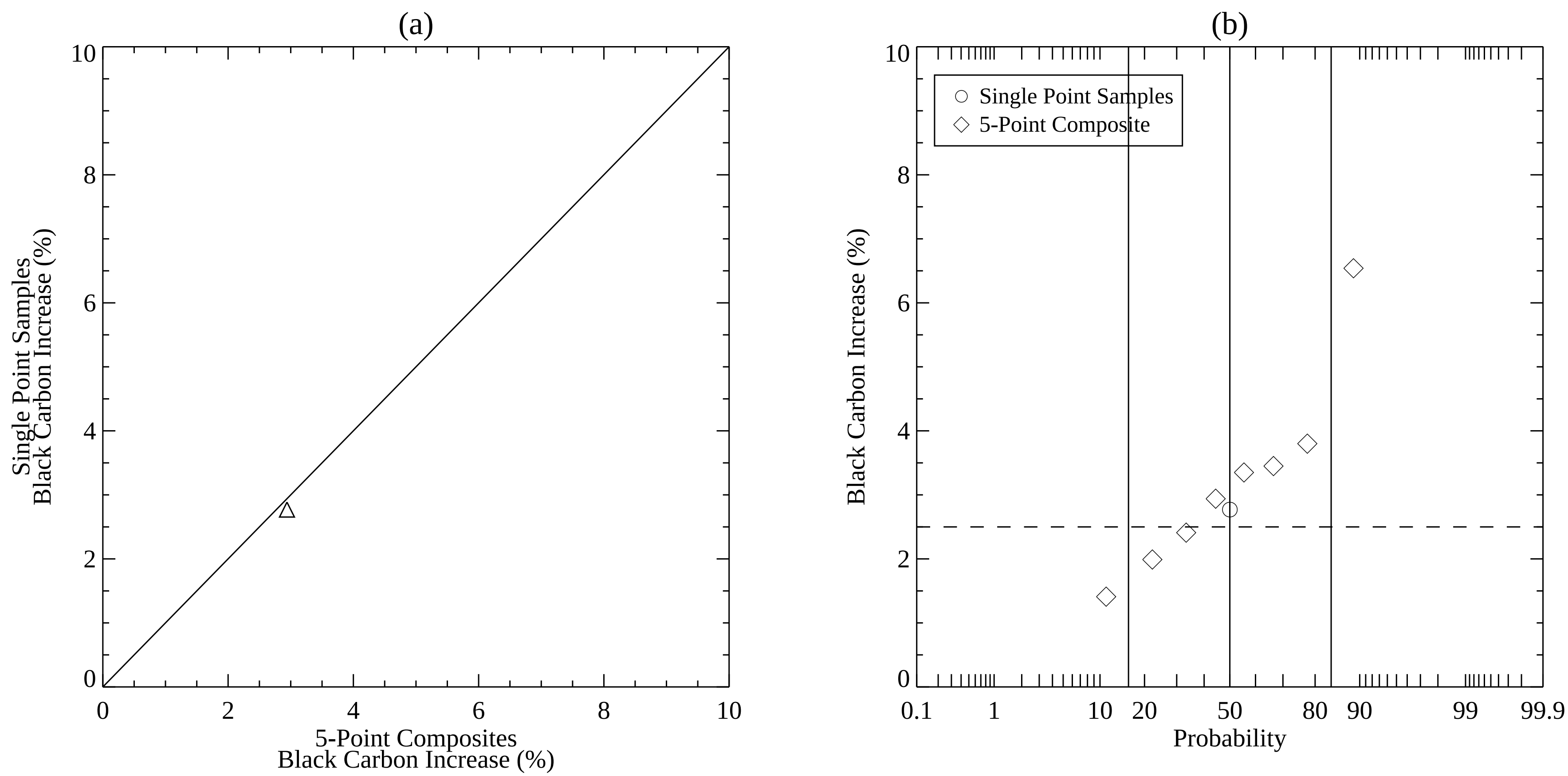


Figure A-33. Black Carbon (BC-C) Increase in Single Point and 5-Point Composite Samples - Tine Sled Mixed Treatment Area

Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C).
The dashed horizontal line represents the target carbon increase (2.5%).
Data from location "TSUTA-8" is excluded as samples were collected from outside the application area.
Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_3MethAvg_SinglevsComp.pro
Fri Mar 30 09:38:35 2007

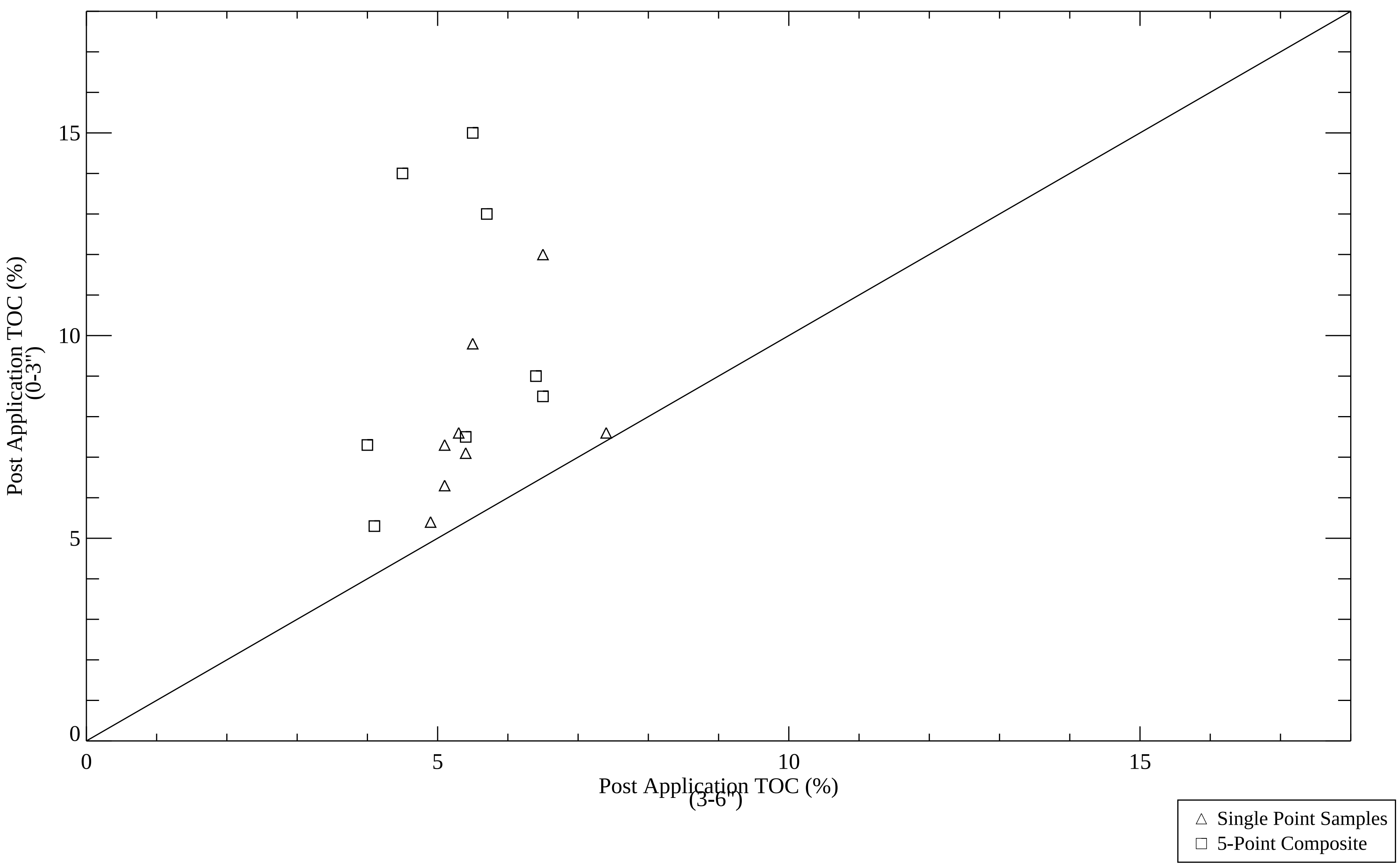


Figure A-34. Post-Application TOC Levels in Surface (0-3") and Subsurface (3-6") Samples from the Unmixed Tiller Treatment Area

Duplicates are averaged.

Data table: sed_aro_ACPS

MS - \\Mindy\d_drive\ALCgra\Analysis\ac_comparison\xplot_posttoc.pro
Wed Dec 06 11:21:20 2006

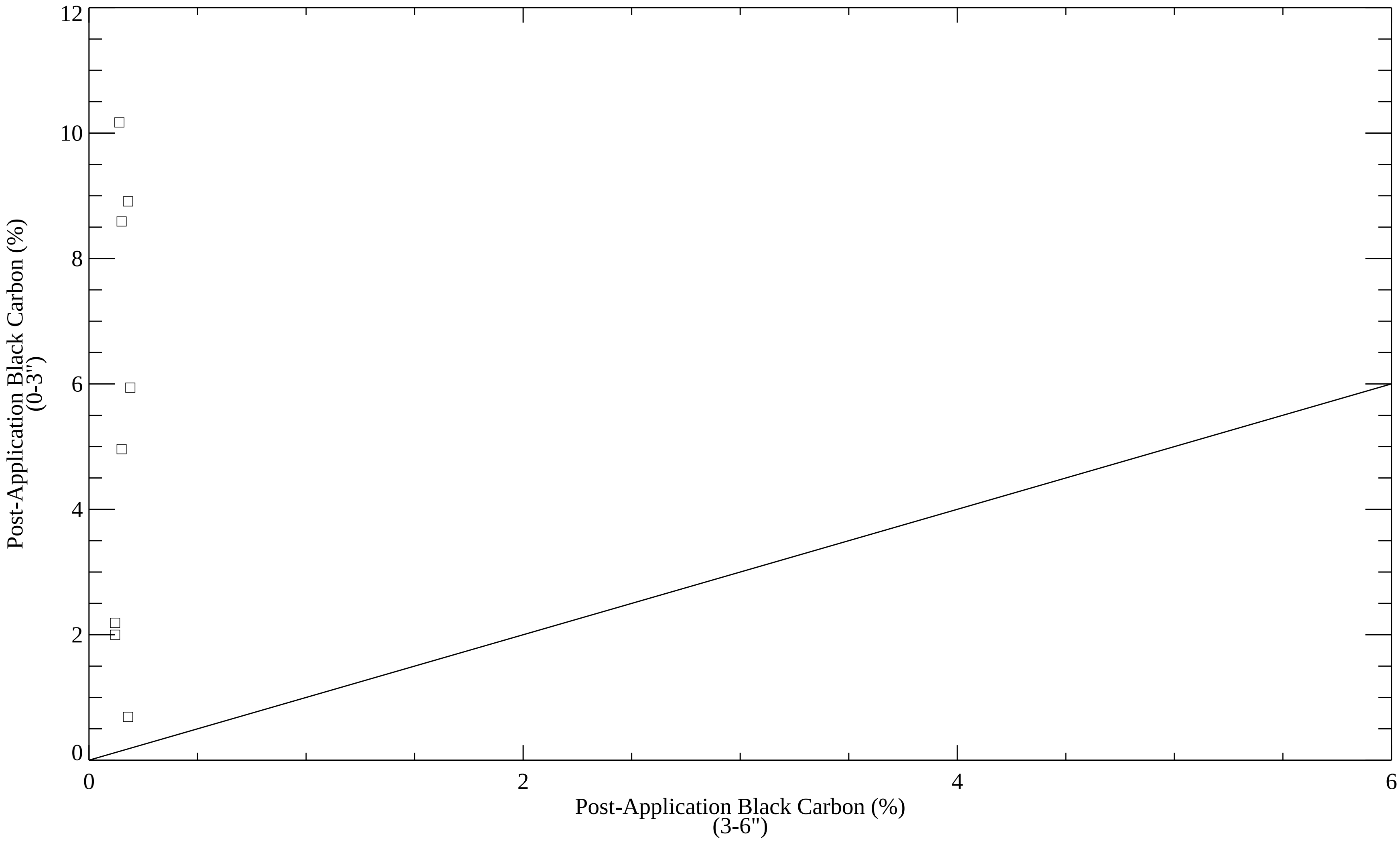


Figure A-35. Black Carbon (BC-C) Levels in Surface (0-3") and Subsurface (3-6") Samples from the Unmixed Tiller Treatment Area

X-axis adjusted to represent difference in data range.

Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C). Duplicates are averaged.

△ Single Point Samples
□ 5-Point Composite

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_1to1_SinglevsComp.pro
Wed Apr 04 10:28:37 2007

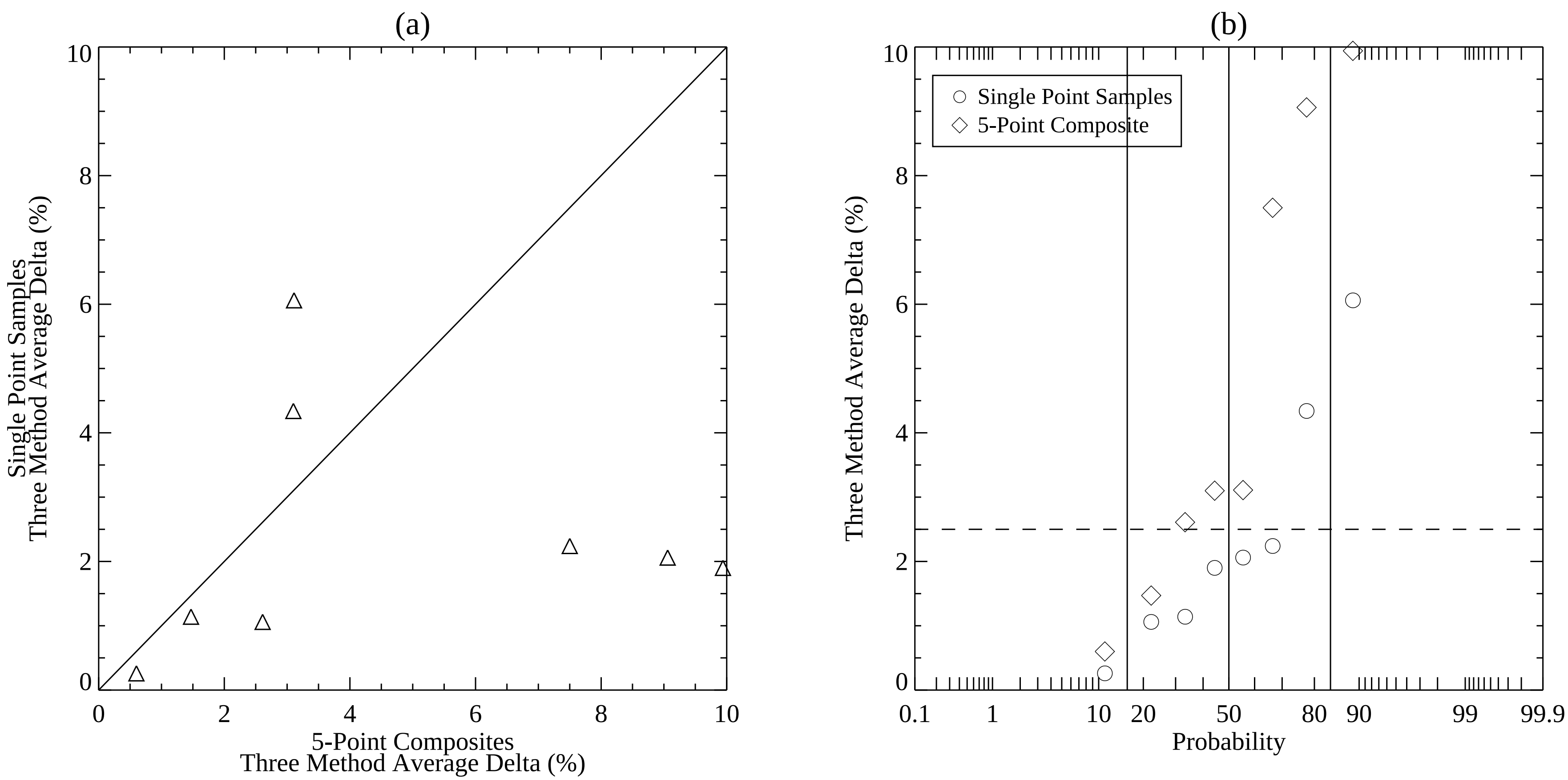


Figure A-36. TOC Increase based on Three Method Avgerage Delta for Single Point and 5-Point Composite Samples from the Unmixed Tiller Treatment Area
Three method average is an estimate of the amount of activated carbon applied to the sediment.
The dashed horizontal line represents the target carbon increase (2.5%).

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_3MethAvg_SinglevsComp.pro
Wed Apr 25 14:45:22 2007

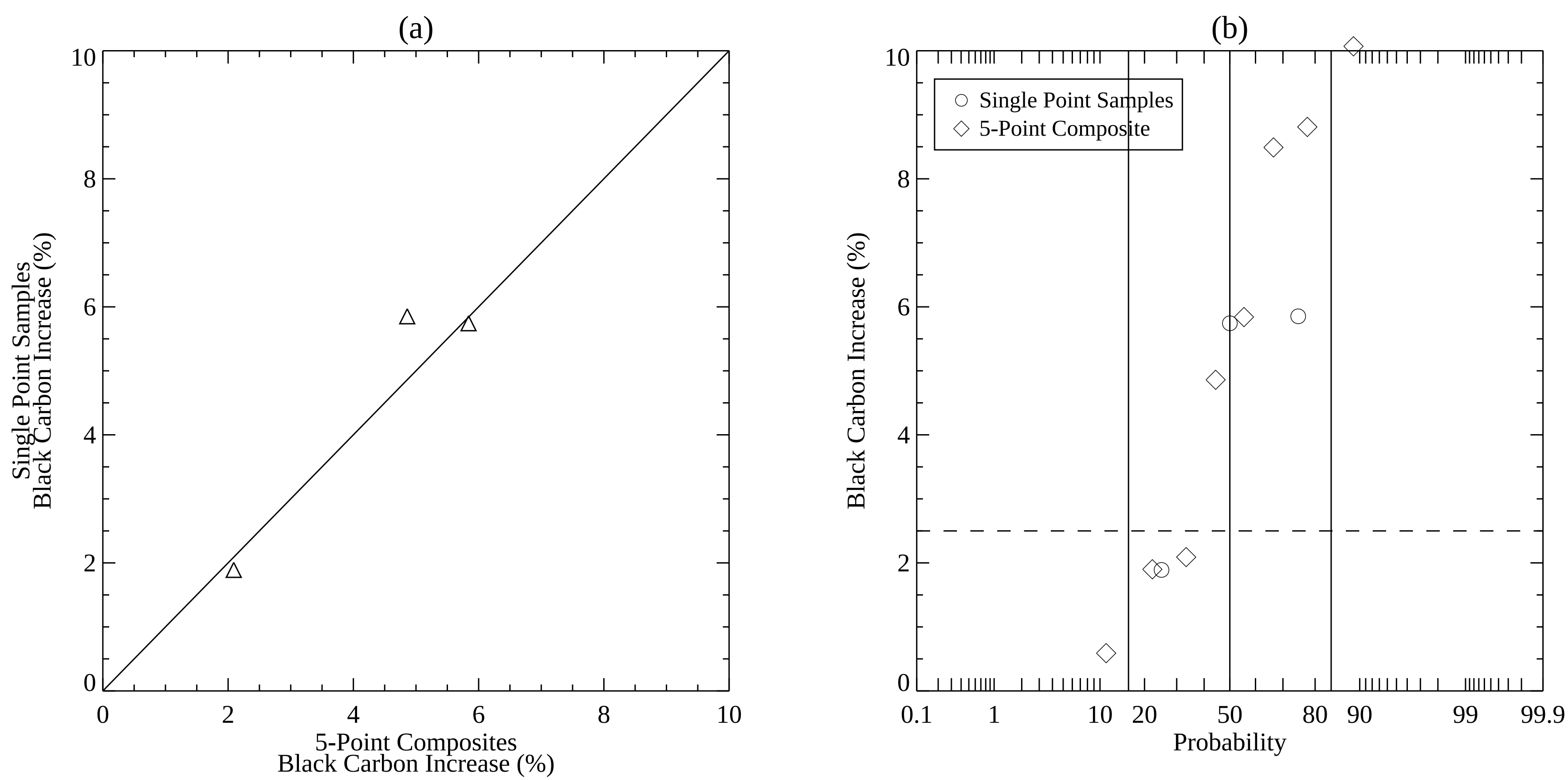


Figure A-37. Black Carbon (BC-C) Increase Single Point and 5-Point Composite Samples - Unmixed Tiller Treatment Area

Black carbon results from UMBC based on the black carbon-chemical preoxidation method (BC-C).
The dashed horizontal line represents the target carbon increase (2.5%).

Data table: sed_aro_ACPS

ARC - D:\ALCgra\Analysis\ACPS\IDL\TOC\BC_3MethAvg_SinglevsComp.pro
Thu Mar 29 16:25:27 2007

Attachments

Attachment A-1

APPENDIX A: Attachment A-1 - QUALITY ASSURANCE/QUALITY CONTROL

Table

SECTION 1
INTRODUCTION

This appendix describes the quality assurance/quality control (QA/QC) evaluation conducted for the sediment, water column, and benthic invertebrate samples collected from the lower Grasse River in 2006 as part of the Activated Carbon Pilot Study (ACPS). Guidelines set forth in the In-Situ PCB Bioavailability Reduction in Grasse River Sediments Final Work Plan (Alcoa Inc. [Alcoa], August 2006) were supplemented, where appropriate, with those contained in the Quality Assurance Project Plan (QAPP) developed for the Grasse River project (Blasland, Bouck & Lee, Inc. [BBL], September 1993). These guidelines were established to assess whether field, laboratory, and data management activities were performed in a manner appropriate for accomplishing the project objectives. This QA/QC review is not applicable to the qualitative aquatic habitat survey and noise monitoring activities conducted during the ACPS and, thus, these data are not discussed in this attachment.

The procedures and metrics used in the QA/QC evaluation are presented in Section 2, while the results of the data evaluation are discussed in Section 3.

SECTION 2
QA/QC PROCEDURES

The QA/QC procedures used to evaluate data collected during the 2006 ACPS sampling consisted of several steps, including:

- review of the field chain-of-custody (COC) forms or field notes and data received from the laboratory for completeness;

- automation of data compilation, when possible, to minimize errors within the database; and

- review of the QA/QC data to assure that results of the quality control analyses are within the control limits developed for the project.

Upon receipt of the data, the field notes and COC forms were reviewed and compared to the data received from the laboratory to ensure that sample identifications listed on the COC forms matched those reported in the data deliverables. This process was used to check that results were received for all field samples.

Following this review, the data were compiled and entered into a Microsoft® Excel database. All field data from the laboratory were received electronically and appended to the existing database using tools available in Microsoft® Access and Excel, whenever possible. The majority of the QA/QC data were received electronically in spreadsheet format from the appropriate laboratory. In some cases, QA/QC data sent in non-spreadsheet format were entered manually into the database from the electronic laboratory data packages. A copy of the environmental database in Microsoft® Access format can be found on the CD-ROM in Attachment A-2.

After the data were incorporated into the project database, several metrics were evaluated to determine the quality of the data. Data metrics used in this evaluation included:

- overall data completeness;
- method detection limits (MDL);

- number of QA/QC samples collected and analyzed;
- blank analysis;
- matrix spike and matrix spike duplicate (MS and MSD) analyses; and
- field duplicate analysis.

Data were deemed acceptable if the following criteria were satisfied:

- Overall data completeness equaled or exceeded 90%. Overall data completeness was computed by dividing the number of valid data obtained by the total number of data planned for collection and analyses.

- MDLs from the QAPP for total polychlorinated biphenyls (PCBs) quantified on an Aroclor basis in sediment and water samples were about 0.080 micrograms per gram (µg/g) and 0.065 micrograms per liter (µg/L), respectively. The MDL for total suspended solids (TSS) in water was 1.0 milligrams per liter (mg/L). An MDL for the analysis of total organic carbon (TOC) in sediment via the USEPA Lloyd Kahn method was not specified in the QAPP. The MDL reported by Northeast Analytical (NEA) for this method was approximately 81 milligrams per kilogram (mg/kg).

- For sediment samples, a minimum of one blind duplicate and one MS/MSD pair was collected for every 20 field samples. For a majority of sediment sampling, rinse blank samples were not collected as field crews used disposable equipment. However, during the in-situ PCB biouptake studies rinse blanks were collected as sampling was conducted using a petite ponar grab sampler.

- For water column monitoring, a minimum of one equipment rinse blank was collected daily. In addition, at least one duplicate sample and one MS/MSD pair were collected for every 20 water column samples.

- PCB levels in laboratory, equipment (rinse), and method blanks were near or below the detection limit.

- Percent recoveries for MS/MSD samples of sediment and water analyzed for total PCBs were between 70 and 130% (to evaluate accuracy).

- The relative percent difference between the percent recoveries of MS and MSD samples analyzed for total PCBs were less than 35% (to evaluate precision).

- The relative percent difference between the field sample and its duplicate analyzed for TOC was less than 35%. Criteria for relative percent differences between field samples and their duplicates analyzed for total PCBs or TSS were not prescribed in the QAPP.

- For benthic samples, extracted portions of sediment were re-examined until less than 5% of the originally extracted organisms were found. If the Percentage Similarity Index was less than 95% between original and QA/QC identification and count, then organisms were re-identified and counted until the index showed greater than 95% similarity.

SECTION 3
RESULTS OF QA/QC ANALYSES

This section presents the results of the QA/QC analyses performed on the environmental data collected during the 2006 ACPS. Discussions of the erosion potential, benthic invertebrate, biological study, water column, and sediment data are provided below.

3.1 EROSION POTENTIAL TESTING

The results of the QA/QC evaluation of the data obtained as part of the ACPS baseline monitoring erosion potential testing are provided below.

Completeness. Samples were collected as planned. A total of 40 field samples were submitted to the laboratory for TSS analysis.

Method detection limit. All samples were analyzed for TSS using a MDL of 1.43 mg/L, which is slightly higher than the QAPP prescribed limit of 1.0 mg/L. None of the 40 TSS samples were reported below this detection limit.

Number of QA/QC samples. The requirement of two field duplicates (one per twenty field samples collected), was not met. One duplicate sample was spilled during transport to the laboratory, and the other duplicate was not collected by the field crew (see Table A1-1). Additional QA/QC samples included 3 laboratory blanks and 3 laboratory control spikes.

Blanks. All laboratory blank concentrations were below the detection limit for TSS.

Matrix spike and matrix spike duplicates. This criterion is not applicable.

Field duplicates. Since data for the field duplicates are not available, the relative percent difference cannot be assessed. Criteria for the relative percent differences between samples and their duplicates analyzed for TSS were not defined in the QAPP.

3.2 BENTHIC INVERTEBRATE COMMUNITY STUDIES

QA/QC analyses were performed by GEI Consultants Inc./Chadwick Ecological Division (Chadwick) on 10% of the benthic samples that were collected as part of this monitoring event. The QA/QC analysis included sample analysis for correctness in organism identification.

To check for thoroughness in extraction, the extracted portions of sediment in each QA/QC sample were re-examined by another biologist to determine if any organisms remained. If more than 5% of the total originally extracted organisms were found, extraction continued and the sample was rechecked until less than 5% of the originally extracted organisms were found.

To check for accuracy in taxa identification, another biologist re-identified and re-counted the organisms found in each QA/QC sample. If the Percentage Similarity Index (Whittaker, 1975) was less than 95% between the original and subsequent QA/QC re-count and identification, the organisms were re-identified and counted again until greater than 95% similarity occurred.

As part of the QA/QC process associated with determination of biomass (wet-weight in milligrams), the electronic balance used to weigh benthic organisms was calibrated prior to use. In addition, the organisms were blotted with a lint-free cloth prior to weighing to remove any excess liquids (i.e., preservatives). All QA/QC results were recorded on laboratory bench sheets.

All reported results of the benthic invertebrate analyses meet the QA/QC requirements specified above.

3.3 FIELD AND LABORATORY BIOLOGICAL STUDIES

3.3.1 In-Situ PCB Biouptake Studies

Data for samples collected during the baseline monitoring in-situ PCB uptake studies are pending. Therefore, there is no QA/QC information to report at this time.

3.3.2 Ex-Situ PCB Biouptake Studies

Data for samples collected during the baseline monitoring in-situ PCB uptake studies are pending. Therefore, there is no QA/QC information to report at this time.

3.4 WATER COLUMN

The results of the QA/QC evaluation of the data obtained as part of the ACPS routine and supplemental water column monitoring are provided below. Individual data that did not comply with the method guidelines and project requirements are listed in Table A1-1.

Completeness. Samples were collected daily during construction activities as planned. A total of 85 field samples were submitted to the laboratory for PCB and TSS analyses. In addition, a total of 10 samples were submitted for supplemental POC analysis, with five of these samples also submitted for TSS.

Method detection limit. All samples were analyzed for PCB using the QAPP prescribed MDL of 0.065 µg/L. All of the 85 PCB samples were reported as having concentrations below this detection limit.

All samples were analyzed for TSS using a MDL of 1.43 mg/L, which is slightly higher than the QAPP prescribed limit of 1.0 mg/L. Twenty of the 85 TSS samples were reported below this detection limit. None of the five supplemental samples were reported below this detection limit.

Number of QA/QC samples. During ACPS activities, 5 field duplicates were collected, meeting the requirement (one per twenty field samples collected). The same requirement was applied to the collection of MS/MSD pairs, which was met with 5 MS and MSD samples. Additional QA/QC samples for PCBs included 20 laboratory blanks, 20 laboratory control spikes, and 20 rinse blanks.

Five duplicates were also submitted for TSS analysis, fulfilling the requirement of 5 duplicates. Additional QA/QC samples for TSS included 20 laboratory blanks and 22 laboratory control spikes. For supplemental sampling, two method blanks and two laboratory control spikes were submitted for POC analysis, and one laboratory blank for TSS analysis.

Blanks. All laboratory and rinse blank concentrations were below the detection limit for PCBs. All laboratory blank concentrations were below the detection limit for TSS.

Matrix spike and matrix spike duplicates. Of the 5 MS/MSD pairs collected, two pairs fell outside the prescribed limits for relative percent difference (greater than 35%), and had a MSD percent recovery falling outside the prescribed range of 70 to 130%. One sample had a MSD percent recovery for Aroclor 1242 of 20% and a relative percent difference of 131.6%. The other sample had a MSD percent recovery for Aroclor 1260 of 23% and a relative percent difference of 125.8% (see Table A1-1). Associated field samples have been qualified as estimated ("J") in the data table water_aro_ACPS found on the CD-ROM in Attachment A-2.

Field duplicates. The relative percent difference between the 5 pairs of samples and their duplicates analyzed for total PCBs and for TSS were 0% and ranged from 11 to 86%, respectively. Criteria for the relative percent differences between samples and their duplicates analyzed for total PCBs and for TSS were not defined in the QAPP.

3.5 SEDIMENT

The results of the QA/QC evaluation of the TOC and black carbon sediment data are provided below. Individual data that did not comply with the method guidelines and project requirements are listed in Table A1-1. It should be noted that inter-laboratory comparisons of black carbon levels in split samples from the ACPS area indicated that the analytical measurement technique used during the project (black carbon-chemothermal precombustion method (BC-T)) did not provide an accurate measure of black carbon levels in the sediments. Black carbon (BC-T) data are included in this discussion for completeness; however the black carbon-chemical preoxidation method (BC-C) was determined to be the most accurate method for estimating black carbon levels (see Section 3.3.2 and Appendix A).

Completeness. A total of 54 field samples were collected during the first baseline sampling event and submitted to the University of Maryland Baltimore County (UMBC) for TOC, PCB (congener), and microscopy analysis, with a subset (36 select samples) submitted for black carbon analysis (BC-C). During the second baseline sampling event, 150 field samples were collected and submitted to NEA for TOC analysis, with a subset (84 select samples) submitted for black carbon analysis (BC-T). During-construction monitoring included the collection of 342 samples, which were also submitted to NEA for TOC analysis, with a subset (235 select samples) analyzed for black carbon (BC-T). In addition, 114 samples were split and shipped to UMBC for black carbon (BC-C) analysis. No samples were lost during shipment or analysis.

Method detection limit. Results from analyses conducted at UMBC are pending and will be included in the next report.

None of the TOC samples submitted to NEA were reported below the detection limit.

Number of QA/QC samples. During the first round of baseline monitoring, three blind duplicates and three MS/MSD pairs were submitted to UMBC for black carbon (BC-C), TOC, PCB (congener), and microscopy analysis, meeting the requirement of one per twenty field samples collected. In addition, eight blind duplicates from during construction sampling were split and submitted to UMBC for black carbon (BC-C) analysis. However, only 4 of the 8 parent samples were also submitted for black carbon (BC-C) analysis, limiting any duplicate comparisons to 4 samples.

The collection and analysis of 32 field duplicates (8 baseline and 24 during-construction) for TOC analysis by NEA exceeded the requirement of 25 duplicates. A subset of these samples (4 baseline and 18 during-construction) were also analyzed for black carbon (BC-T) at NEA.

Blanks. This criterion is not applicable.

Matrix spike and matrix spike duplicates. Analysis of the MS/MSD pairs is ongoing and the results will be included in the next report.

Field duplicates. Analysis of the field duplicates collected during the first baseline sampling event is ongoing and the results will be included in the next report.

Five of the 32 pairs (two baseline and three during-construction) of sediment TOC samples and their duplicates submitted to NEA had relative percent differences greater than 35% (Table A1-1). The relative percent differences of these pairs ranged from 36% to 91%. Given the inherent variability (historic range of non-detect to over 300,000 mg/kg) in TOC levels in the Grasse River and the small amount (i.e., milligrams) of sediment used for TOC analysis, difficulty reproducing TOC results is expected and, thus, does not warrant exclusion of these data from the database. Analysis of samples and duplicates with RPD falling outside the limit was not repeated by the laboratory. Criteria for the relative percent differences between samples and their duplicates analyzed for black carbon were not defined in the QAPP.

SECTION 4
SUMMARY

In general, the quality of the data for erosion potential, benthic invertebrate, water column, and sediment samples collected during the 2006 ACPS met the guidelines established for the project. On the infrequent occasions when guidelines were not met, the affected samples are identified in the database as appropriate. As a result of this QA/QC evaluation, data that were collected during the ACPS and presented in this attachment were deemed appropriate for use in performing qualitative and quantitative evaluations required to satisfy the project objectives.

SECTION 5
REFERENCES

Alcoa Inc. (Alcoa). August 2006. *In-Situ PCB Bioavailability Reduction in Grasse River Sediments Final Work Plan*.

Alcoa Inc. (Alcoa). March 2006. *2006 Monitoring Work Plan*.

Blasland, Bouck & Lee, Inc. (BBL). September 1993. *River and Sediment Investigate (RSI) Phase II Operations Plan*.

Whittaker, R.H., 1975. *Communities and Ecosystems*. New York: Macmillan Publishing Co., Inc.

Table

Table A1-1
Individual Samples Not Meeting QA/QC Guidelines

Activated Carbon Pilot Study Construction Documentation Report
Grasse River Study Area, Massena, New York

Media	Analyte	Sample Date	Location (depth or analyte)	Field Sample	Field Duplicate	% Recovery MS	% Recovery MSD	Relative % Difference Field Duplicate	Relative % Difference MS/MSD	Reason for Non-Compliance
Erosion Potential	TSS	8/2/06	---	---	***N/A***	---	---	***N/A***	---	No field duplicate collected
		8/3/06	M9-2-9[8]	940.0	***N/A***	---	---	***N/A***	---	Field duplicate collected but lost
Water	PCB	9/20/06	WCT46 (Aro 1242)	---	---	97.0	***20.0***	---	***131.6***	MSD falls outside %R limit; MS/MSD falls outside RPD
		9/20/06	WCT46 (Aro 1260)	---	---	101.0	***23.0***	---	***125.8***	MSD falls outside %R limit; MS/MSD falls outside RPD
Sediment	TOC	9/13/06	TESTAM-16 (0-3in)	82000	57000	---	---	***36.0***	---	Field duplicate falls outside RPD limit
		9/14/06	TESTTM-3 (3-6in)	24000	64000	---	---	***90.9***	---	Field duplicate falls outside RPD limit
		10/6/06	MTA-9 (0-3in)	62000	38000	---	---	***48.0***	---	Field duplicate falls outside RPD limit
		10/10/06	MTA-16 (0-3in)	49000	76000	---	---	***43.2***	---	Field duplicate falls outside RPD limit
		10/10/06	MTA-14 (0-3in)	84000	120000	---	---	***35.3***	---	Field duplicate falls outside RPD limit

Notes:
1. Units: TOC (Sediment) = milligrams/kilogram, in = inches, TSS (Water) = micrograms/liter
2. Criteria listed in QAPP (BBL, September 1993): MS/MSD %R should be between 70 and 130%, RPD should be less than 35%, Surrogate %R should be between 60 and 150%.
3. Bold and italicized numbers indicate where samples did not meet criteria.
4. RPD of MS/MSD sample based on percent recoveries.
5. RPD of field duplicate sample based on sample concentrations.
6. RPD = |(A-B)| / ((A+B)/2) * 100
7. --- Not applicable; N/A not available.
8. Location 'M9-2-9' represents the TSS sample collected after a shear stress of 9 dynes per square centimeter was applied to the second core collected at baseline location M9.

MS = matrix spike
MSD = matrix spike duplicate
%R = Percent Recovery
RPD = Relative Percent Difference
PCB = polychlorinated biphenyl
TOC = total organic carbon
Aro = Aroclor

Attachment A-2

Appendix A: Attachment A-2 – Data Dictionary for ACPS Environmental Database

Table A-1
Data Dictionary for benthic_comm_ACPS

Data Table Description: Benthic community data from within the ACPS areas during 2006 pre-ACPS baseline monitoring.

Field Name	***Description***
Survey	Survey period (pre-Phase 2 = baseline sampling pre-ACPS)
Lab	Laboratories where samples were analyzed (CDM = Camp Dresser & McKee Soils Laboratory (grain size); Chadwick = Chadwick & Associates. (benthic); NEA = Northeast Analytical, Inc. (TOC))
Year	Sample year
Month	Sample month
Day	Sample day
Sampling_Area	General area of sampling (background, mixed tiller treatment area, tine sled mixed and unmixed tiller treatment areas)
Sample_Method	Sampling method (ponar = petite ponar grab in the river channel)
Sample_ID	Location where sample was collected (BG = background, M = mixed tiller treatment area, U = tine sled mixed and unmixed tiller treatment areas)
Wc_dep	Total depth of water column (feet)
Sample_dep	Approximate depth of water column sample (feet)
pH	pH (standard units)
Cond	Specific conductivity (milliSiemens/centimeter)
Turb	Turbidity (nephelometric turbidity units)
DO	Dissolved oxygen (milligrams/liter)
Temp	Temperature (degrees Celsius)
Velocity	Water velocity (feet per second)
Gravel_coarse	Coarse gravel composition (% by mass)
Gravel_fine	Fine gravel composition (% by mass)
Sand_coarse	Coarse sand composition (% by mass)

(continued)

Table A-1
Data Dictionary for benthic_comm_ACPS
(continued)

Field Name	***Description***
Sand_medium	Medium sand composition (% by mass)
Sand_fine	Fine sand composition (% by mass)
Silt	Silt composition (% by mass)
Clay	Clay composition (% by mass)
TOC	Total organic carbon (%)
Hexagenia_limbata *through* Sphaeriidae	Number of species identified
Tot_indiv	Total number of individuals identified
Tot_taxa	Total number of taxa identified
Tot_mass	Total mass of taxa identified

Comments:

(1) -999 indicates parameter not measured.
(2) See Figure A-5 of Appendix A for sampling locations.

Table A-2
Data Dictionary for ChaseMills_ACPS

Data Table Description: Flow records for the Grasse River at Chase Mills (USGS Gage 04265432), recorded every 15 minutes during ACPS monitoring (1/1/2006 – 12/31/2006)

Field Name	***Description***
Year	Sample year
Month	Sample month
Day	Sample day
Minute	Sample Minute
Gage_height	River water level at Chase Mills(feet)
Flow	River flow (cubic feet/second)

Comments:

(1) -999 indicates parameter not measured

Table A-3
Data Dictionary for ero_pot_ACPS

Data Table Description: TSS results from 2006 pre-ACPS erosion potential testing

Field Name	***Description***
Lab	Laboratory where samples were analyzed (ChemLab = Alcoa Massena ChemLab)
Lab_ID	Laboratory identification number
Sample_ID	Sample identification code
QC_Type	Sample type (sample = unfiltered field sample, blk = TSS blank, lcs = laboratory control spike)
Collection_date_time	Sample collection date and time
TSS	Total suspended solids (milligrams/liter)
TSS_rec	Total suspended solids recovery (%)
TSS_dup_rec	Total suspended solids duplicate recovery (%)
Location	Sample collection location

Comments:

(1) -999 indicates parameter not measured
(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -1.43 means the concentration was less than the DL of 1.43 milligrams per liter.
(3) See Figure A-1 of Appendix A for sampling locations.

Table A-4
Data Dictionary for sed_aro_ACPS

Data Table Description: 2006 pre, during and post-ACPS sediment core data

Field Name	***Description***
Survey	Survey name (pre-Phase 2 = baseline sampling pre-ACPS, Phase 2 = during-ACPS)
Year	Sample year
Month	Sample month
Day	Sample day
Time	Sample time
Lab	Laboratory where samples were analyzed (NEA = Northeast Analytical, Inc.)
Lab_id	Laboratory identification number
Sample_id	Sample identification code
Type	Sample type (core, grab, or qaqc = quality assurance/quality control)
Northing	1983 NY State Plane Northing (feet)
Easting	1983 NY State Plane Easting (feet)
Start_dep	Starting depth of sample
End_dep	Ending depth of sample
Dep_units	Units of depth of measured sample
TOC	Total Organic Carbon (Lloyd Kahn method; milligram/kilogram dry weight)
BC_C	Black Carbon (Black carbon-chemical pre-oxidation analytical method; milligram/kilogram dry weight)
Per_solids	Percent solids (%)
B_dens	Bulk density (grams/milliliter)
Per_moist	Percent moisture (%)

(continued)

Table A-4
Data Dictionary for sed_aro_ACPS
(continued)

Field Name	***Description***
Location	Identifies area where sample was collected; used to identify the original sample for duplicates
Dup	Indication of sample duplicate (DUP = yes, blank = no)
Notes	Indication of sample collection type (blank = single-point, 5 sample composite = 5-point composite)

Comments:

(1) -999 indicates parameter not measured
(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -124 means the concentration was less than the DL of 124 milligrams per kilogram dry-weight.
(3) See Figures A-8, A-15, A-19 and A-20 of Appendix A for sampling locations.

Table A-5
Data Dictionary for sed_field_ACPS

Data Table Description: 2006 pre, during and post-ACPS sediment core field data

Field Name	***Description***
Survey	Survey name (pre-Phase 2 = baseline sampling pre-ACPS, Phase 2 = during-ACPS)
Year	Sample year
Month	Sample month
Day	Sample day
Time	Sample time
Point_ID	Sample identification code (matches with “location” in sed_aro_ACPS)
Northing	1983 NY State Plane Northing (feet)
Easting	1983 NY State Plane Easting (feet)
Water_elev	Water elevation (feet)
Sed_elev	Sediment elevation (feet)
Water_dep	Depth of water (feet)
Notes	Notes recorded by field crew
Penet_ft	Penetration depth (feet)
Recovery	Sediment recovered during coring (feet)
Type	Sample collection technique (core = single-point sample, composite = 5-point composite)

Comments:
(1) -999 indicates parameter not measured.
(2) Water and sediment elevations based on USLS 35.

Table A-6
Data Dictionary for water_aro_ACPS

Data Table Description: 2006 ACPS water column data analyzed for PCB (Aroclor) and TSS

Field Name	***Description***
Lab	Laboratory where samples were analyzed (ChemLab = Alcoa Massena ChemLab)
Lab_ID	Laboratory identification number
Sample_ID	Sample identification code
QC_Type	Sample type (sample = unfiltered field sample, ms1 = matrix spike, sd1 = matrix spike duplicate, blk = laboratory or TSS blank, lcs = laboratory control spike)
Collection_date_time	Sample collection date and time
Aro_1016 *through* Aro_1260	Aroclor_# concentration, where # = 1016, 1221, 1232, 1242, 1248, 1254, 1260 (micrograms/liter)
Tot_PCB	Aroclor total PCB concentration (micrograms/liter)
TSS	Total suspended solids (milligrams/liter)
TSS_rec	Total suspended solids recovery (%)
TSS_dup_rec	Total suspended solids duplicate recovery (%)
Location	Sample collection location
DUP_location	Indication of sample duplicate location
QUAL_PCB	Data qualifier (J = estimated)
Decachlorobiphenyl	Decachlorobiphenyl concentration (micrograms/liter)
Tetrachloro-m-xylene	Tetrachloro-meta-xylene concentration (micrograms/liter)

Comments:

(1) -999 indicates parameter not measured
(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -0.065 means the concentration was less than the DL of 0.065 micrograms per liter.
(3) Parentheses indicate depth at which sample was collected. If no depth is indicated, then sample is a composite of samples taken at 0.2, 0.5, and 0.8 times the water column depth.
(4) See Figure A-14 of Appendix A for sampling locations.

Table A-7
Data Dictionary for water_field_ACPS

Data Table Description: 2006 ACPS field water quality measurements made during water column sample collection

Field Name	***Description***
Survey	Survey name (pre-Phase 2 = baseline sampling pre-ACPS, Phase 2 = during-ACPS)
Year	Sample year
Month	Sample month
Day	Sample day
Samp_time	Time of sample collection
Location	Sample collection location
Wc_dep	Depth of water (feet)
Sample_dep	Depth of sample (feet)
Temp	Temperature (degrees Celsius)
PH	pH (standard units)
Cond	Specific conductivity (milliSiemens/centimeter)
Turb	Turbidity (nephelometric turbidity units)
DO	Dissolved Oxygen (milligrams/liter)
Weather	Description of weather during sampling
Air_temp	Air temperature (degrees Celsius)
Construct_activity	Description of daily construction activity
Comments	Field notes

(continued)

Table A-7
Data Dictionary for water_field_ACPS
(continued)

Field Name	***Description***
DepFrac_Collected	Water column depth fraction at which samples were collected for analysis
DUP_Collect_Loc	Duplicate sample location

Comments:

(1) -999 indicates parameter not measured; N/A indicates parameter not applicable.

(2) See Figure A-14 of Appendix A for sampling locations.

Table A-8
Data Dictionary for water_TSS_ACPS

Data Table Description: 2006 ACPS supplemental water column data analyzed for POC and TSS

Field Name	***Description***
Survey	Survey name (Phase 2 = during-ACPS)
ChemLab_ID	Laboratory identification number for samples analyzed by ChemLab (TSS)
NEA_ID	Laboratory identification number for samples analyzed by NEA (POC)
Sample_ID	Sample identification code
Type	Sample type (sample = unfiltered field sample, qaqc = quality assurance/quality control)
Date	Sample collection date
Time	Sample collection time
POC	Particulate organic carbon (milligrams/liter)
TSS	Total suspended solids (milligrams/liter)
TSS_rec	Total suspended solids recovery (%)
TSS_dup_rec	Total suspended solids duplicate recovery (%)
Location	Sample collection location (water column monitoring location or application cell)

Comments:

(1) -999 indicates parameter not measured

(2) Negative numbers (other than -999) indicate the concentration was below the detection limit (DL), i.e. -1.43 means the concentration was less than the DL of 1.43 milligrams per liter.

Table A-9
Data Dictionary for water_turb_ACPS

Data Table Description: 2006 ACPS supplemental continuous turbidity monitoring during activated carbon application

Field Name	***Description***
Survey	Survey name (Phase 2 = during-ACPS)
Samp_Year	Sample year
Samp_Month	Sample month
Samp_Day	Sample day
Samp_Time	Time of sample collection
Location	Sample collection location
Wat_Depth	Depth of water (feet)
Sample_Dep	Depth of sample (feet)
Turbidity	Turbidity (nephelometric turbidity units)
Activity	Notes recorded by field crew

Comments:
(1) -999 indicates parameter not measured

Attachment A-3

ASSESSMENT OF ACTIVATED CARBON IN PRE- AND POST-TREATMENT SEDIMENT SAMPLES FROM GRASSE RIVER

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BACKGROUND

This research was conducted to measure the dose of activated carbon (AC) achieved in sediments after the Activated Carbon Pilot Study (ACPS) in Grasse River. Based on prior laboratory studies, the target dose of AC to achieve reduction of PCB bioavailability in surficial sediments was 2.5% by dry weight. A direct measurement of AC in post treatment sediment core samples was sought to evaluate the actual dose of AC achieved in the treatment plots using different application modes. As described in section 3.3.2. of the ACPS Construction Documentation Report, two qualitative visual methods and two quantitative analytical methods were used initially to evaluate the amount of AC in sediments after treatment. The qualitative methods involved removal of clays from the sediment samples by washing or sieving followed by visual observation of the presence of AC. The quantitative methods involved evaluating the differences in sediment total organic carbon (TOC) or black carbon (BC) in pre- and post-treatment sediment core samples. The natural variability of sediment TOC (4-7%) made it difficult to quantify the achieved dose of AC based solely on TOC difference in cores samples from the same locations before and after application. The BC analysis based on low temperature (375 ^{o}C) pre-combustion of natural organic matter was expected to aid in the analysis by removing the interference of the variable natural organic matter content. However, during the progress of the BC measurements it was realized that some AC was being oxidized along with natural organic matter at 375^{o}C. The ACPS Final Report therefore uses a weight of evidence approach to make the best interpretation possible using the TOC data. The approach (named ‘three method average’) was designed to reduce the uncertainty from natural organic matter variability and involved estimating a more representative pre-treatment TOC value in sediment cores by averaging the pre-application TOC value at that site, the average pre-application surface sediment TOC value, and the post application TOC value of the 3-6” interval at that site.

In this research the BC measurement method was explored further to develop an alternative approach to assess AC in sediments and reduce the variability from background natural organic matter. Past research has not produced a definitive method for measuring black carbon. As described in Nguyen et al. (2004), there are four broad categories of black carbon assessment methods: 1) microscopic examination, 2) thermal/optical measurement, 3) chemical oxidation, and 4) chemothermal oxidation. Each method has its unique advantages and disadvantages. The chemothermal method adopted in the initial assessment utilizes a low temperature (375 ^{o}C) pre-combustion to burn off a major portion of the natural organic carbon while preserving most of the black carbon (or elemental carbon) in the sample (Gustaffson et al., 1997). The chemothermal oxidation method was not designed for measuring activated carbon. Jonkers and Koelmans (2002) reported that activated carbon showed 31% black carbon by this method.

Therefore the chemothermal method was modified at UMBC to reduce the oxidation of activated carbon and enable the assessment of sediment amended with activated carbon. Figure 1 shows the results of studies at UMBC demonstrating the progressive burnoff of natural organic carbon and activated carbon (Clagon TOG) with increasing temperature. Based on these results it appeared that pre-combustion of the sediment sample at 375 ^oC for four hours can reduce the background natural carbon to 1% (nearly 80% reduction) without significantly affecting the activated carbon. At 400 ^oC, most of the activated carbon is also burnt off. When the same pre-combustion conditions were applied to the two types of AC used in the Grasse River field application (Carbsorb and coconut shell based AC), results showed that both natural organic carbon and AC were oxidized. Figure 2 shows the results of four hour pre-combustion at 375 ^oC of Grasse River sediments spiked with different amounts of Carbsorb AC (50 – 200 mesh). As shown in Figure 2, there was little difference in carbon measured between the blank and any of the spiked sediment samples. This indicated that natural organic carbon as well as the added AC was being oxidized. When the Carbsorb or coconut shell AC was pre-combusted by itself for four hours at 375 ºC, it was not significantly affected and most of the carbon remained. However, when mixed with the sediment, both the Carbsorb and coconut shell AC was oxidized at 375 ºC. It is hypothesized that in the presence of sediment, natural organic carbon adsorbs to the surface of the AC and can act as a catalyst to lower the ignition temperature of the AC, causing it to burn off at 375 ^oC. This hypothesis is being examined further through additional experiments at UMBC. Experiments using numerous combinations of time and temperature were performed, but recoveries of the Carbsorb and coconut shell AC were insufficient by the thermal oxidation technique. After failing to achieve high enough recovery of the Carbsorb and coconut shell AC while removing the natural organic carbon using thermal oxidation, a different approach using wet chemical oxidation was pursued.

In the wet chemical oxidation method, a strong oxidizing agent such as H_2O_2 or $Cr_2O_7^{-2}$ is used to oxidize the natural organic matter while retaining the black carbon. Black carbon forms are known to be resistant to chemical oxidation. The wet chemical oxidation is followed by a high temperature (900 ^oC) oxidation to measure the remaining black carbon as CO_2. Below is a description of the chemical oxidation technique used in this study to isolate and quantify AC in a sediment matrix.

DESCRIPTION OF THE WET CHEMICAL OXIDATION METHOD

The wet chemical oxidation method uses a sulfuric acid/potassium dichromate solution to oxidize most of the natural organic carbon in river sediments while preserving the majority of the activated carbon added to the sample. This method was based on earlier work performed by Bird and Grocke (1997) and was modified at UMBC for use in the measurement of activated carbon in Grasse River sediment samples.

Acid Solution Preparation

A volume of concentrated sulfuric acid was measured into a glass bottle. $K_2Cr_2O_7$ was added to the measured acid to produce a 0.1 M solution. The solution was stirred with a magnetic stirrer for one hour. While the solution was being stirred, a vortex was seen at the surface of the liquid. When finished stirring, the solution was very viscous as well as dark orange in color. No specks of $K_2Cr_2O_7$ were visible in the solution after stirring. Prior to each use, the solution was stirred for at least 10 minutes to ensure that any precipitated solids were dissolved back into solution.

Sample Preparation: Wet and Dry Sediment

Samples for black carbon analysis that are reacted wet require a moisture content analysis. The sample was well mixed before measurement. Between 5 and 10 grams of the sediment was measured into an evaporating dish of a known weight. The sample was dried for at least 2 hours at 110 °C. The dried sample was then reweighed and the percent moisture content calculated. After calculating the percent moisture content, the amount of wet sediment equivalent to 200mg +/- 10 mg dry sediment was weighed on a balance sensitive to the ten thousandth of a gram. The wet sediment was then carefully transferred from the dish to a chemical oxygen demand (COD) test tube with the aid of a squirt bottle filled with DI water. The test tube was capped, centrifuged, and the overlying water decanted or pipetted making sure that no floating particles were lost. For samples that were reacted with the acid dry, 200 mg +/- 10 mg were weighed out in a metal weighing dish on a balance sensitive to the ten thousandth of a gram. Again, the samples were well mixed before measurement. A metal weighing dish was used to reduce static interaction between the dish and sediment. After the sediment was weighed, it was carefully transferred using a metal spatula from the dish to a COD test tube and capped.

Acid Addition to Wet and Dry Sediment

Due to the high viscosity of the acid solution, acid additions to sediment were not performed using a pipette. All acid additions to the sediment were made by pouring from a graduated cylinder into the COD test tubes. For both the wet and dry sediment, 5 mL of the acid solution was added to the test tube. For the wet sediment, a violent exothermic reaction takes place at approximately 1 minute after acid addition. The test tubes are loosely capped to allow gases to escape during the reaction. After the reaction, the caps were tightened. The test tubes with dry sediments were shaken to thoroughly mix the acid solution and sediment.

Acid Reaction in a Water Bath

After adding the acid to the sediments, the COD tubes were placed in a hot water bath set at 60 °C +/-1 °C. The sediment samples were allowed to react with the acid in the water bath for one hour with the caps loose to allow any gases to escape. The one-hour reaction period was broken down into two half-hour steps. After the first half-hour step, the COD tubes were removed from the water bath and centrifuged to settle the solids. The supernatant was decanted and 5 mL of fresh acid solution added to the COD tubes. After the acid was replaced, the tubes were placed back in the hot water bath for the second half-hour step. After reacting for a total of 1 hour in the hot water bath, the samples were centrifuged and the supernatant decanted.

Removal of Excess Acid Solution

After decanting the overlying acid, the remaining acid in the sample was removed with two methanol rinses. Methanol rinses were performed by filling each COD tube with 3 to 5 mL of methanol. The COD tubes were shaken to thoroughly mix the sediment and methanol. After shaking, the caps were loosened to allow gases to escape. The caps were then retightened and the COD tubes were centrifuged and the supernatant decanted. This rinsing procedure was performed a second time. The final supernatant was clear and colorless.

Sample Transfer to Combustion Boat

Once the excess acid was removed, the samples were ready to be transferred into combustion boats made of alumina ceramic. COD tubes were filled with approximately 0.5 mL of methanol. The sample was stirred and pipetted using a disposable glass transfer pipette into the combustion boats. Any sample remaining in the COD tube after the first transfer was removed using a second transfer performed in the same manner. Once all transfers were complete, the samples boats were put in a drying oven in a fume hood for at least one hour at 110 °C to remove methanol.

Sediment TOC Measurement

The Total Organic Carbon (TOC) analysis was performed using a Shimadzu TOC analyzer with a solids sample module (TOC-5000A and SSM-5000A). Carbon in the sample was combusted to form CO_2, which was detected by a non-dispersive infrared gas analyzer (NDIR). The sediment TOC analysis followed an operating procedure recommended by the manufacturer. The prepared sample in a ceramic combustion boat was inserted in a 900 ^{o}C combustion furnace. The high temperature and pure oxygen environment, in conjunction with a platinum catalyst, provided complete oxidation of carbon compounds into CO_2 gas and water. The produced CO_2 gas was detected by a NDIR detector. The total organic carbon concentration was determined by generating a calibration curve with known standards and comparing area counts of the unknown sample to that of the best-fit line in the calibration curve.

Instrument TOC calibration

The instrument was calibrated using a carbon-source standard (e.g., reagent-grade glucose or naphthalene). A series of calibration curves that accommodate the expected working ranges of the samples were generated as per instrument manufacturer's recommended procedures. The generally accepted measurement range for most carbon analyzers is from 0.1 mg to 30 mg of carbon in a solid sample; maximum sample size is limited to 1.0 g. For TOC analysis in sediment samples, this instrument's minimum detection limit for carbon, based on a 200 mg dried sample and a lowest calibration point of 0.1mg C, is 0.05%. If lower detection limits are required, sample amount can be increased up to 1000 mg.

Appropriate QA/QC samples were analyzed along with each batch of ten sediment samples to include: 1) Background blank, 2) Blind duplicate sample, and 3) Carbon QC-check sample. The acceptance criteria were as follows: ± 20 % relative percent difference (RPD) for duplicate analysis; and percent recovery of carbon from QC-check sample, 90-110%. The background blank sample should not give a value higher than the stated minimum detection limit of 0.1 mg carbon. If a batch run did not meet the above quality standards, the analysis of all samples within the failed batch were repeated until the run was in full compliance with the QC requirements.

RESULTS

Results of AC calibration. AC was added to Grasse River sediment in the laboratory to prepare a range of calibration standards of sediment containing AC. Percent AC added was calculated based on the dry weight of sediment. Figures 3 and 4 shows the calibration results of the chemical oxidation method for Grasse River sediment with 0%, 1%, 2.5%, and 5% AC added.

Sediment without any AC addition shows very low TOC measurement (<0.1%) after the chemical oxidation process. Thus most of the background natural organic matter in Grasse River sediments is oxidized by the wet chemical oxidation pretreatment. There is a linear relationship between AC dose in sediment and TOC measured after the wet chemical oxidation. The residual TOC remaining after chemical oxidation (defined as black carbon) is 80% for Carbsorb AC and 87% for coconut shell AC. The calibration plots shown in Figures 3 and 4 were used to calculate the dose of AC in sediment samples obtained from the field.

Results of field sample analysis. The wet chemical oxidation technique turns the color of Grasse River sediment to light grey as shown in Figure 5. Most of the vegetative debris and detritus are oxidized during the chemical oxidation process. The unreacted AC preserved through the chemical oxidation process is nicely visible under a light microscope. Also shown in Figure 5, samples with elevated AC assessment clearly demonstrate the high abundance of activated carbon particles observed visually. Bleaching of the natural sediment particles in the chemical oxidation process enhances the visibility of the AC particles.

Pre-application samples

The pre-application core samples analyzed at UMBC were not collected from the exact same locations as the samples collected immediately after application of AC. There were nine sampling locations from the three treatment areas as illustrated in Figure 2-7 in the ACPS Final Report. Results of the AC analysis of pretreatment core samples from the treatment areas are shown in Figure 6. The average AC measurement in the top 0-6 inches over the entire treatment area was 0.1% with a low standard deviation of 0.04%. The results demonstrate that the wet chemical oxidation technique is effective in removing the background interference from natural organic matter present in the sediment.

Mixed Tiller Treatment Area samples

Samples analyzed from the Mixed Tiller Treatment Area (MTA) were either single-point cores or composite samples made up of five separate cores collected from a 3x3 ft sampling grid as described in section 3.3.4 in the ACPS report. Twenty single-point core samples were analyzed at three depth intervals each (0-3”, 3-6”, and 6-12’). The ten composite samples were analyzed at two depth intervals each (0-3” and 3-6”). The average AC value for the top three inches of sediment in the MTA area was 3.00% with a standard deviation of 2.46% based on both single-point and composite core analysis. Although the average dose of AC achieved was above the target of 2.5%, there was variability across the treatment area as illustrated in Figure 7. The measured values ranged from near background to about 10% AC. Nearly 90% of the samples received a dose of AC more than 1% and nearly half of the samples received a dose of 2% or higher. The ten composite core samples gave an average of 3.85% AC (SD = 1.53%) in the top 3 inches of sediment, whereas, the 20 single point core samples gave an average of 2.58% AC (SD = 2.75%) in the top 3 inches of sediment. Sediment core samples below 3” barely showed any presence of AC. Except for a couple of sample locations, all AC values for 3-6” depths and 6-12” depths were close to the pretreatment background measurements.

Tine Sled Unmixed Treatment Area samples

A total of 9 composite sediment core samples were analyzed for the Tine Sled Unmixed Treatment Area (TSUTA). All but one composite core samples were analyzed at sediment depth intervals of 0-3” and 3-6”. The average AC measured for the top three inches of sediment was 2.97% with a standard deviation of 1.82%. However, it should be noted that one of the samples from the TSUTA (TSUTA-8) was collected outside of the treatment area. Excluding TSUTA-8, the average AC measured in the top three inches of sediment was 3.34%. As shown in Figure 8, two thirds of the samples analyzed in TSUTA received a dose of AC greater that the target dose of 2.5%. Except for one location, none of the samples in this region had AC in the 3-6” depth.

Unmixed Tiller Treatment Area samples
A total of 8 composite sediment core samples were analyzed in the Unmixed Tiller Treatment Area (UTA) and are presented in Figure 9. All 8 composite core samples were analyzed at depths of 0-3” and 3-6”. The average AC measured for the top three inches of sediment was 5.43% with a standard deviation of 3.58%. Among the three treatment areas, this area achieved the highest average dose of carbon based on the composite core samples analyzed. Nearly 60% of the treatment area received a dose of AC greater than the target dose of 2.5%. As seen in the other two treatment areas, there was no AC measured in the core samples at 3-6” depth.

Initial Testing Area samples
A total of 9 single point sediment samples were analyzed from the Initial Testing Area (Tiller Mixed and Tiller Unmixed samples) and are presented in Figure 10. All 9 single point samples were analyzed at the 0-3” depth. The average AC measured in this initial testing area was the lowest at 1.64% with a standard deviation of 1.06%.

QC samples
Quality control samples were analyzed throughout the 3-month period of analysis of the field sediment samples. Background blank samples consisting of empty combustion boats were analyzed periodically over the analysis period. The measured TOC values from blank combustion boats were consistently below the minimum detection limit of 0.1 mg carbon. The quality control samples also included blank Grasse River sediment and Grasse River sediment amended with 2.5% AC (both Carbsorb and coconut shell AC). As shown in Figure 11, the blank Grasse River sediment gave a consistently low AC measurement (0.07% ± 0.02). Grasse River sediment amended with both carbon types gave consistent AC measurements throughout the analysis period (2.49% ± 0.12 for Carbsorb AC and 2.54% ± 0.09 for coconut shell AC). Many of the field samples were split at UMBC and analyzed in duplicate. The duplicate measurements are very close as seen in Figure 12 and span a large range of AC values from zero to seven percent.

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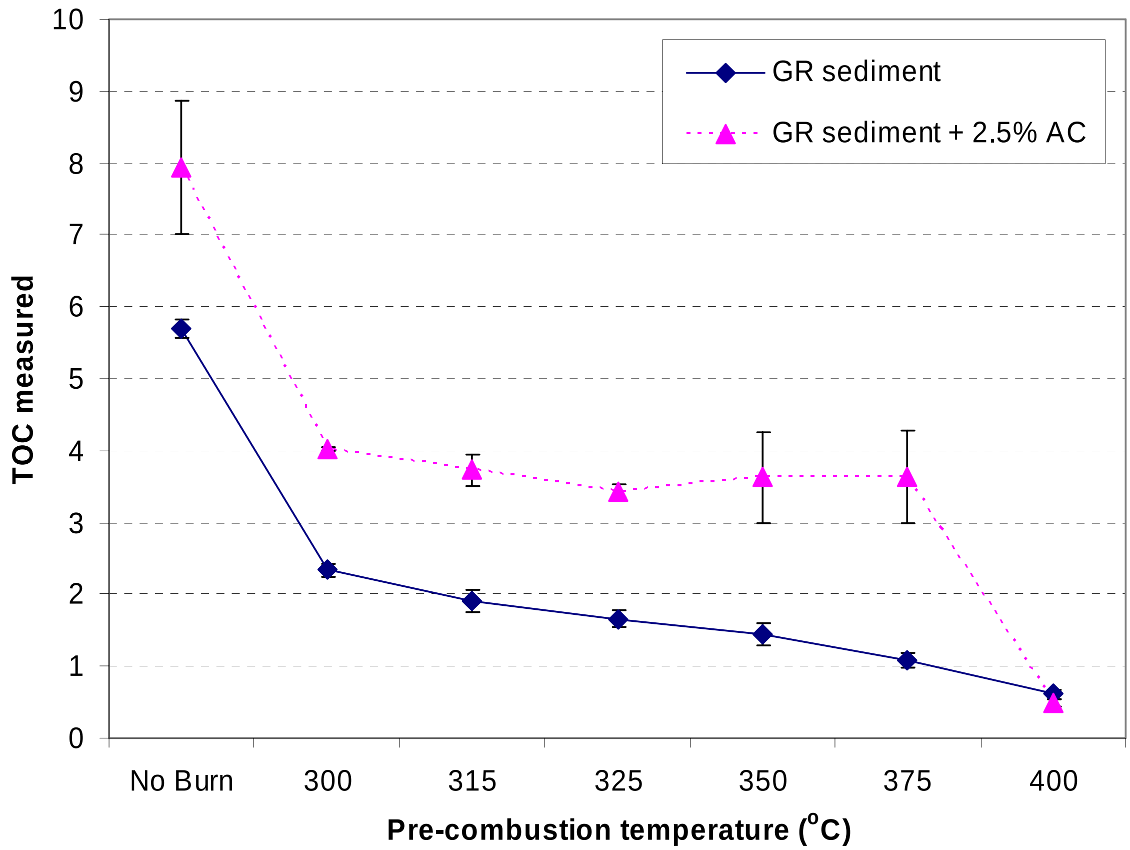


Figure 1. Effect of different precombustion temperatures (for 4 hours) on the measurement of total organic carbon in Grasse River sediment mixed with 2.5% AC. The carbon used was Calgon TOG 50-200 mesh.

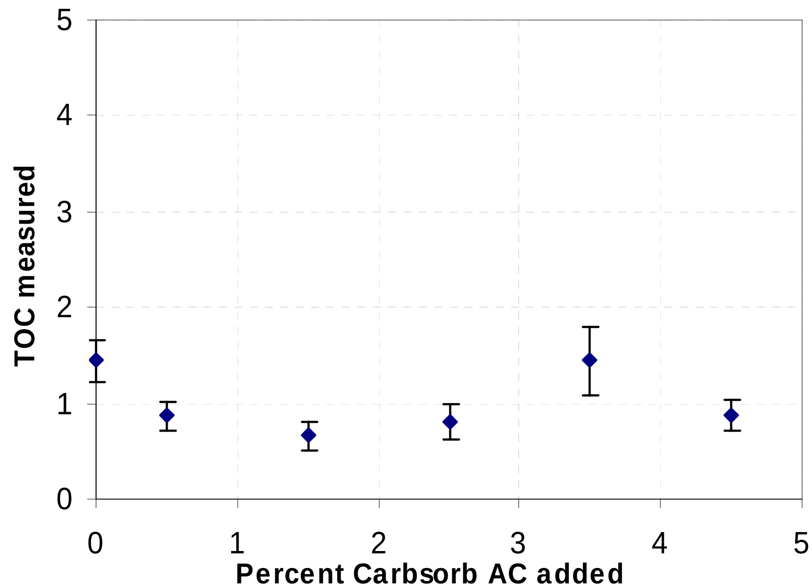


Figure 2: Carbsorb AC measured as % TOC after sediment was combusted for 4 hours at 375ºC

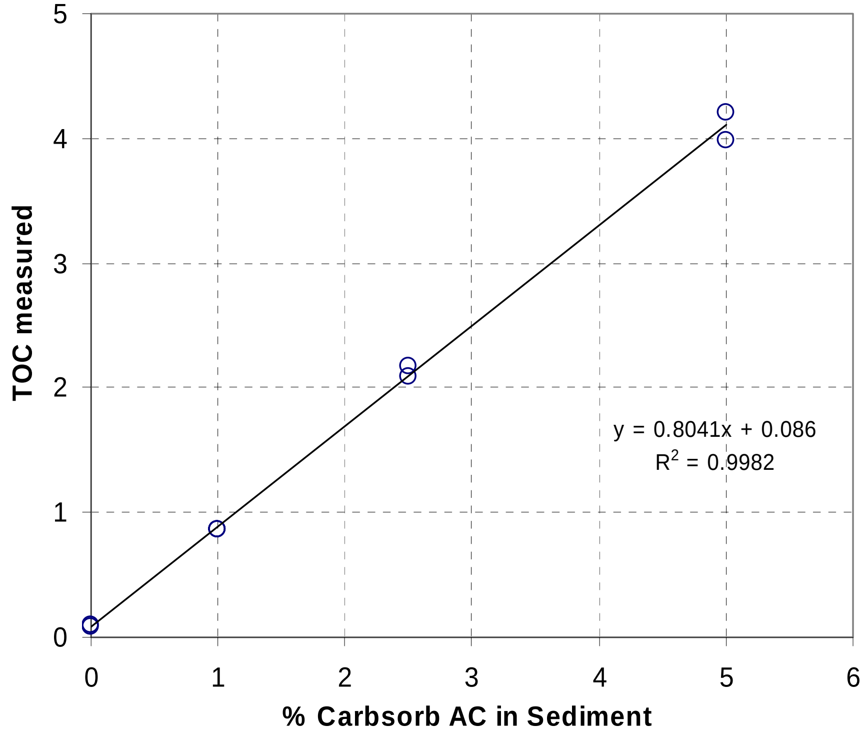


Figure 3. TOC measured after chemical oxidation pretreatment of Grasse River sediment amended with different doses of Carbsorb activated carbon.

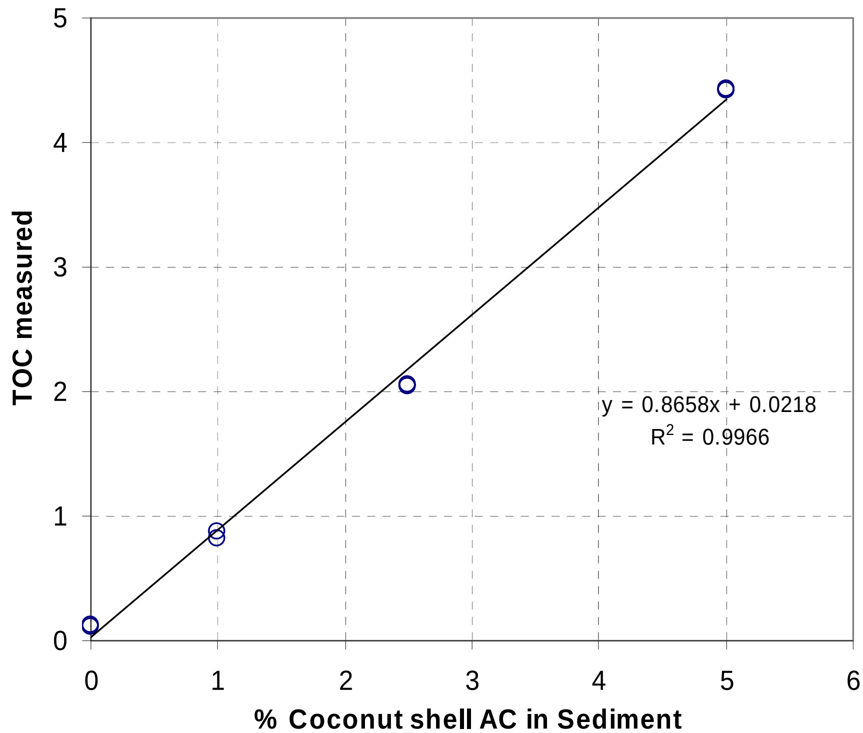


Figure 4. TOC measured after chemical oxidation pretreatment of Grasse River sediment amended with different doses of coconut shell activated carbon.

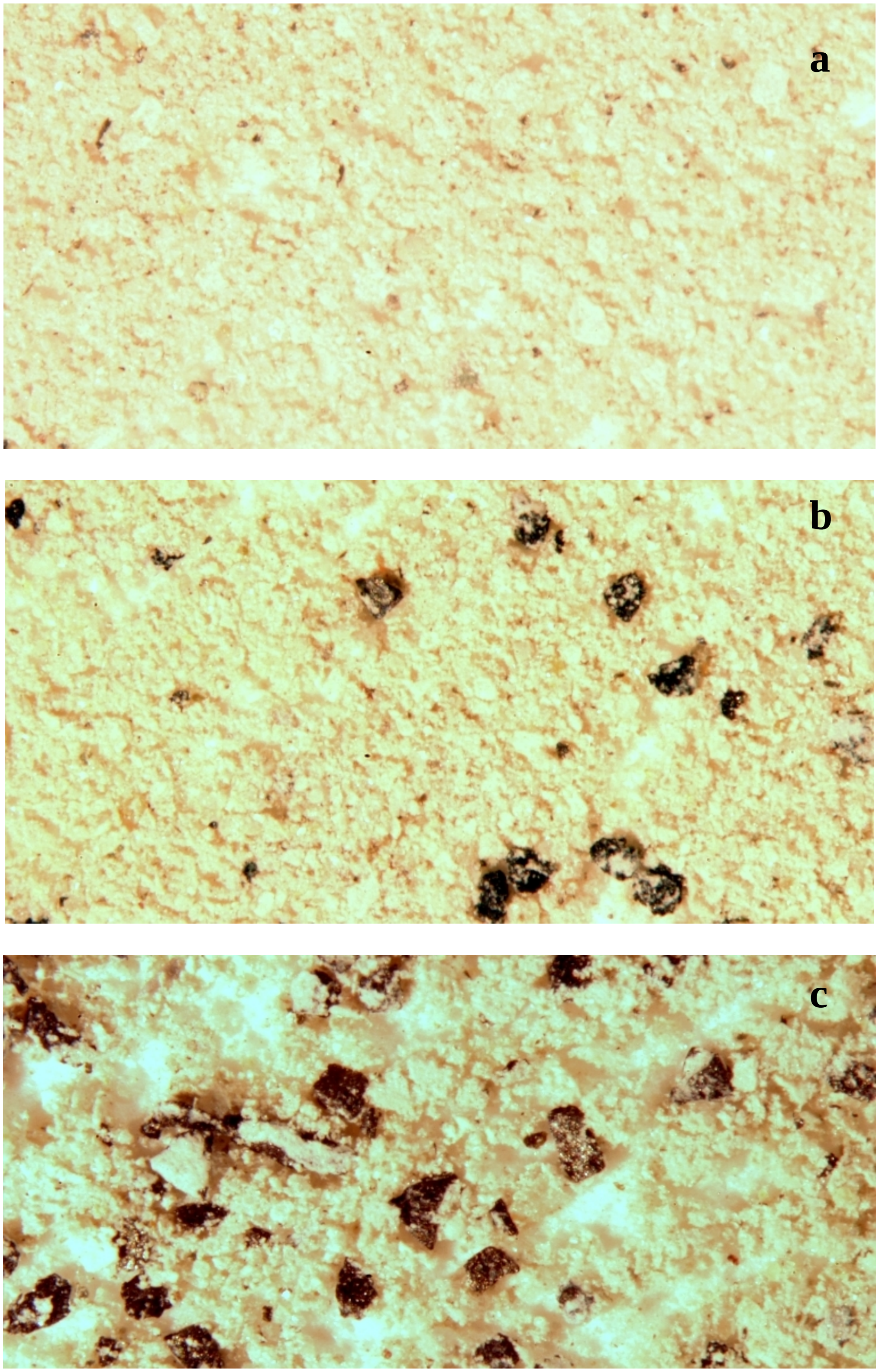


Figure 5. Microscopy images of sediment core samples after chemical oxidation showing a) sample with no activated carbon (MTA 24 3-6"); b) sample with low activated carbon (MTA 24 0-3"); and c) sample with high activated carbon (MTA 18D 0-3").

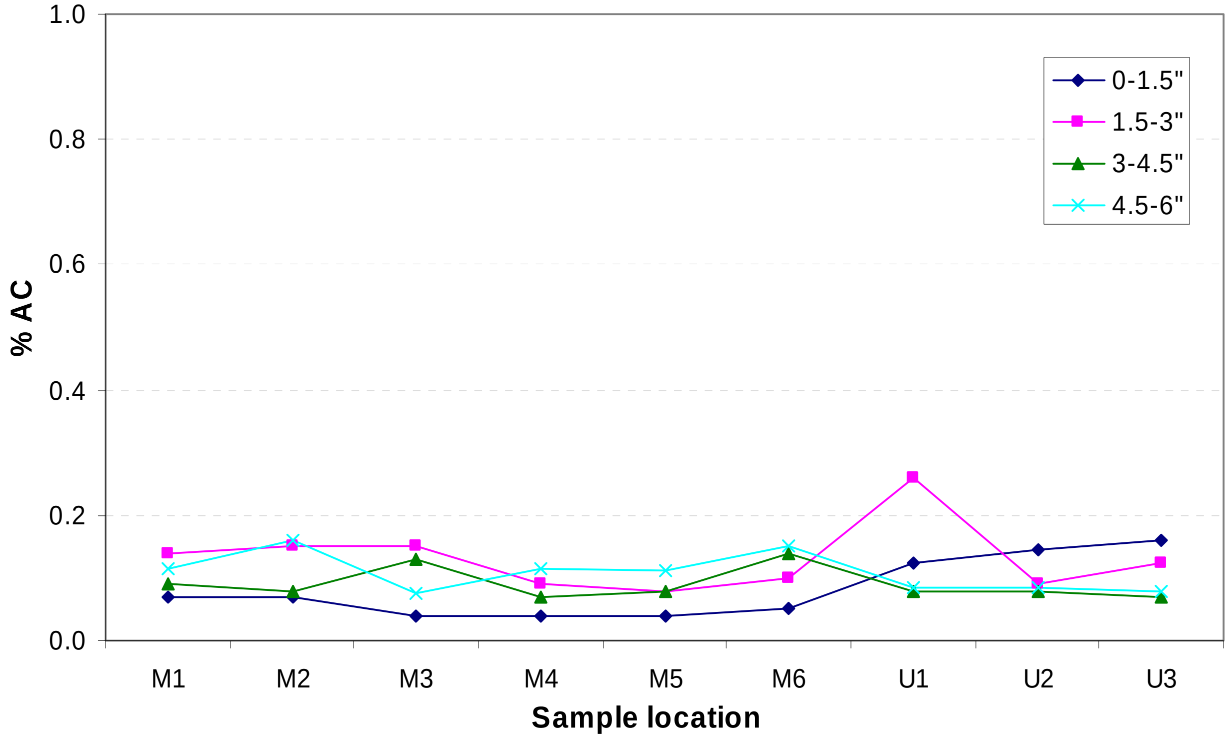


Figure 6. AC measured by wet chemical oxidation technique for the different sample locations in the Treatment Areas before AC application (single-point core samples). Average AC = 0.1% (SD = 0.04)

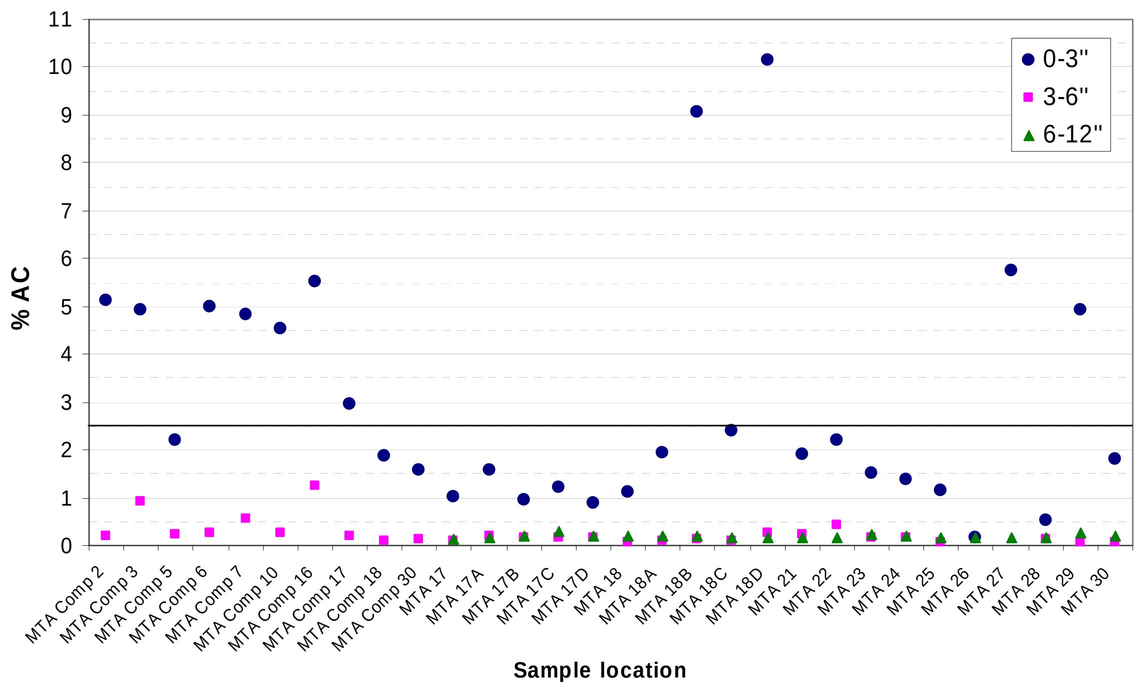


Figure 7. AC measured by wet chemical oxidation technique for the different sample locations in the Mixed Tiller Treatment Area (includes single-point and 5-point composite core samples). Average AC = 3.00% (SD = 2.46)

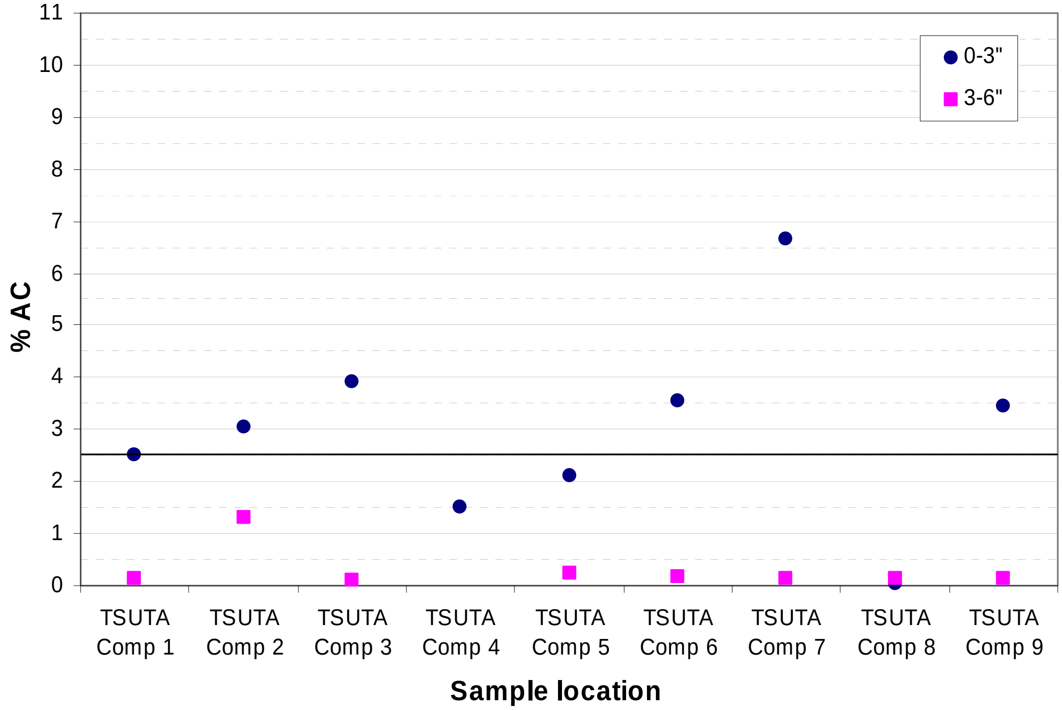


Figure 8. AC measured by wet chemical oxidation technique for the different sample locations in the Tine Sled Unmixed Treatment Area (5-point composite core samples). Average AC in 0-3" = 2.97% (SD = 1.82)

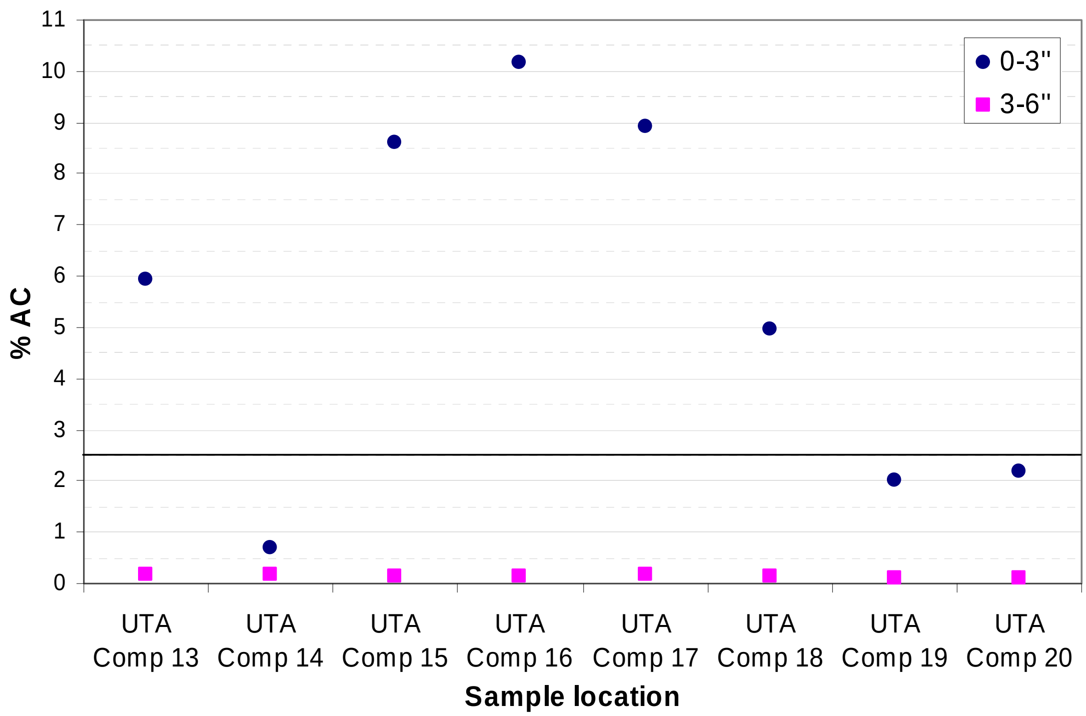


Figure 9. AC measured by wet chemical oxidation technique for the different sample locations in the Unmixed Tiller Treatment Area (5-point composite core samples). Average AC in 0-3" = 5.43% (SD = 3.58)

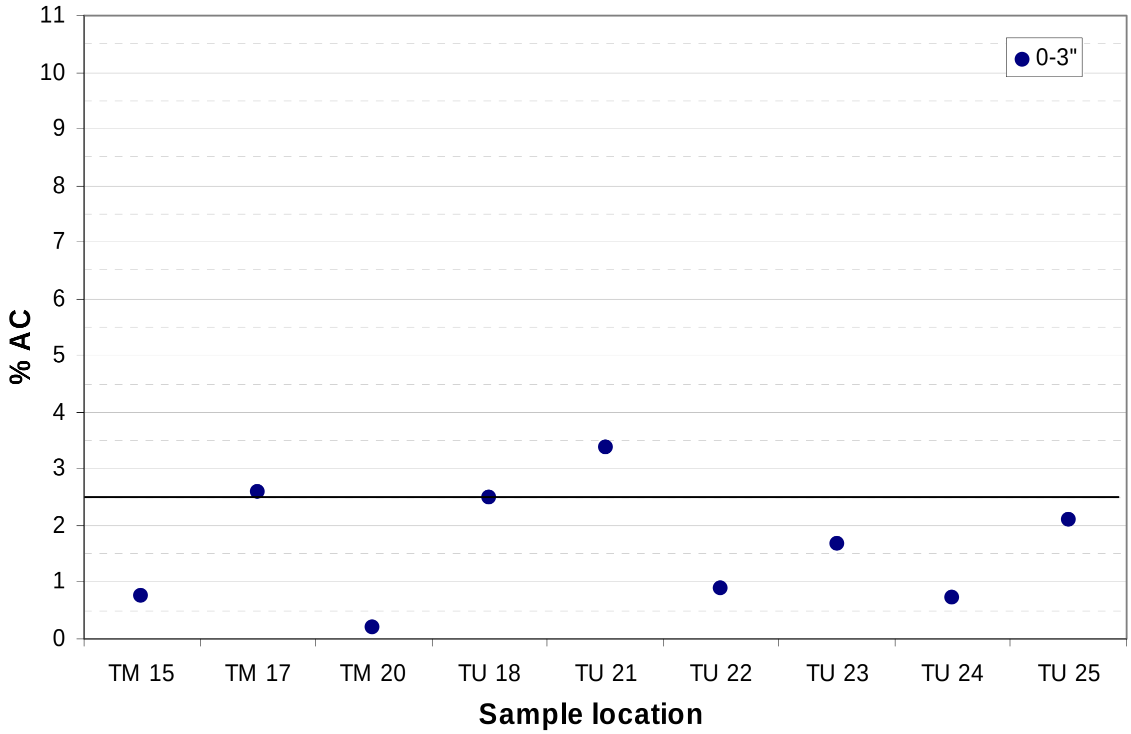


Figure 10. AC measured by wet chemical oxidation technique for the different sample locations in the Initial Testing Area (single-point core samples). Average AC = 1.64% (SD = 1.06)

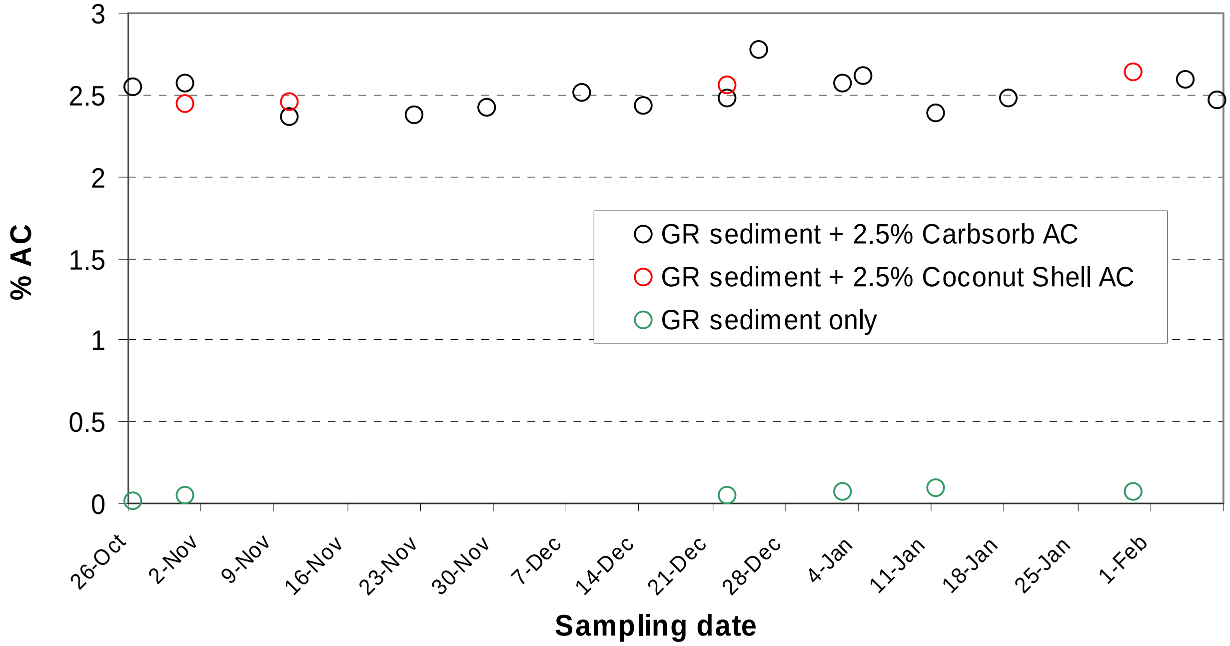


Figure 11. Analysis of blank Grasse River sediment and quality control check samples (Grasse River sediments + 2.5% AC) analyzed through the 3-month period of sample analysis.

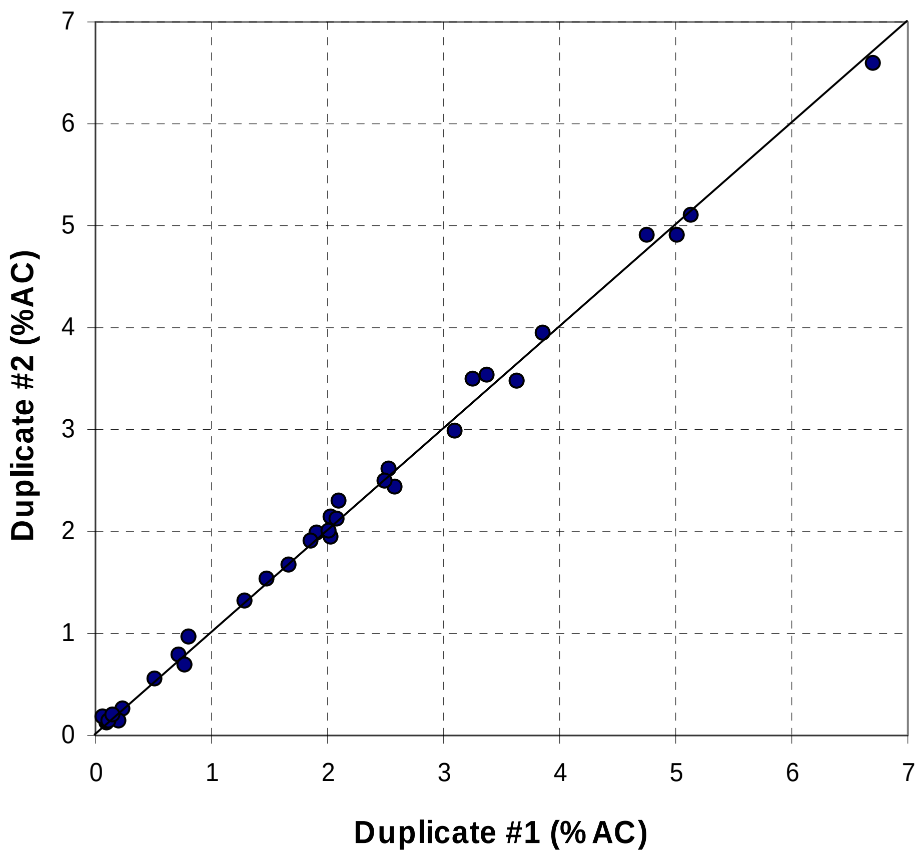


Figure 12. Analysis of duplicate samples split at UMBC.

Attachment A-4

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/20/2006

Construction Activities: silt curtain installation

Comments: N/A

Water Column Data Stratification Present: WCT43: no ACPS-1: --- ACPS-2: --- ACPS-3: --- WCT46: no

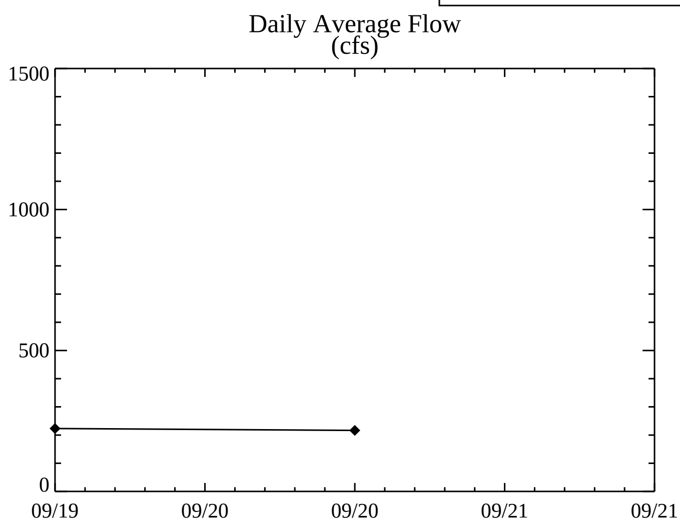
Mean Flow (cfs): 217

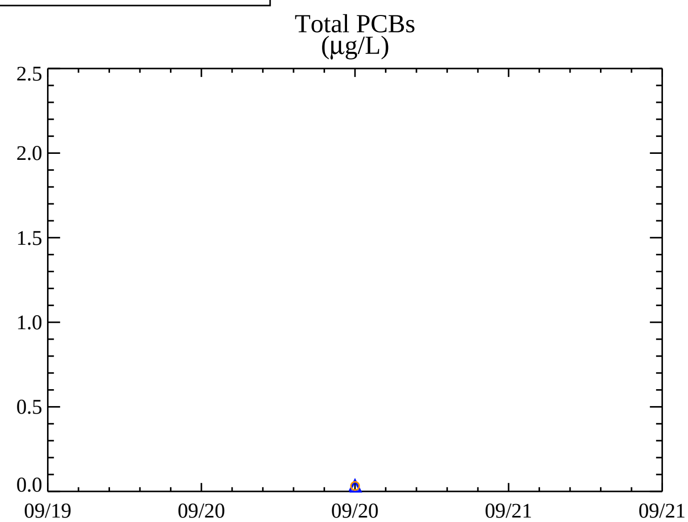
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

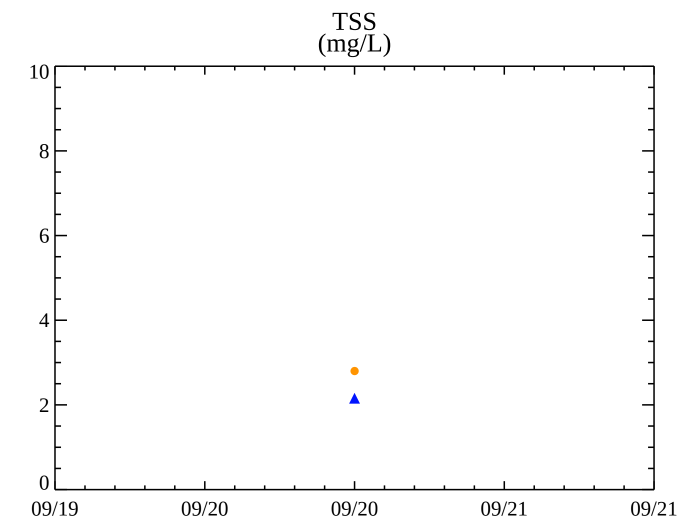
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND (ND)	---	---	---	---	ND	---
TSS (mg/L)	3.60(ND)	---	---	---	---	2.80	---
Turbidity (NTU)	2.3	---	---	---	---	2.4	no

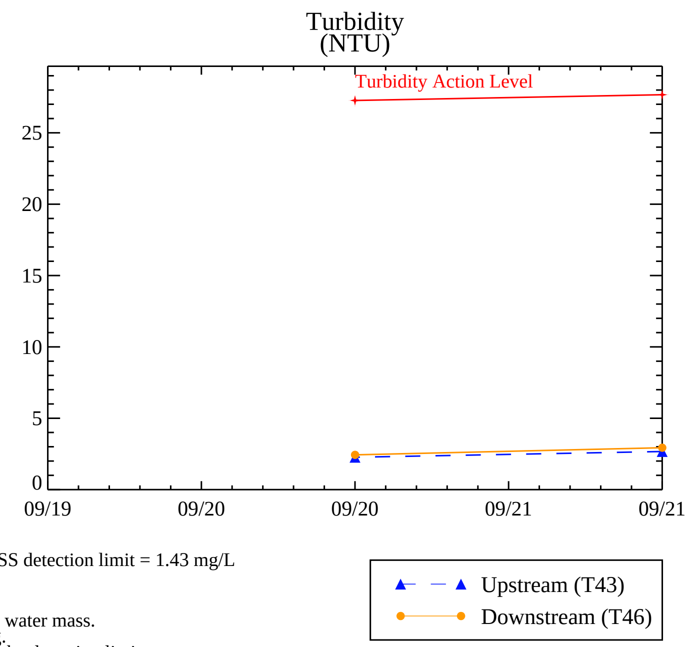
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Wed May 16 10:09:22 2007

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/21/2006

Construction Activities: silt curtain installation

Comments: start time for curtain installation 0830

Water Column Data

Stratification Present: WCT43: no ACPS-1: --- ACPS-2: --- ACPS-3: --- WCT46: no

Mean Flow (cfs): 208

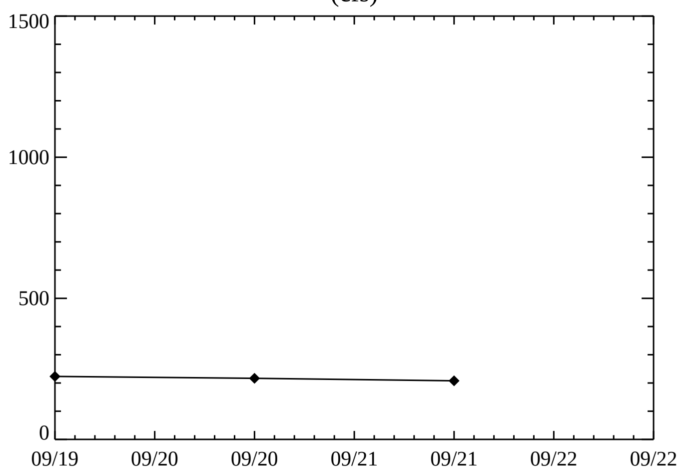
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	---	---	---	---	ND	---
TSS (mg/L)	2.00	---	---	---	---	2.40	---
Turbidity (NTU)	2.7	---	---	---	---	2.9	no

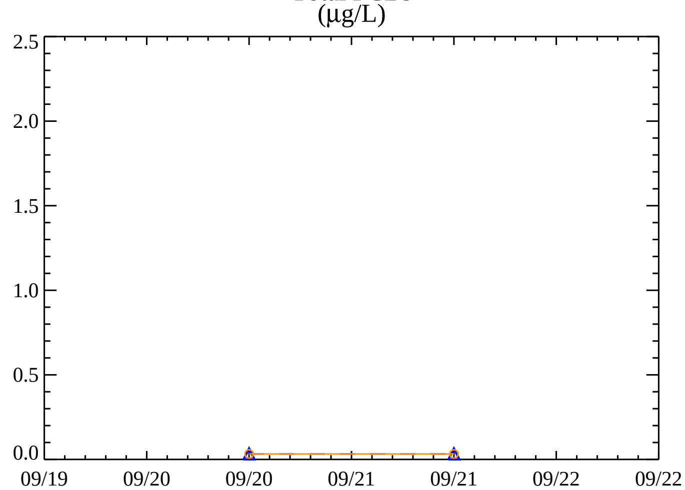
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA

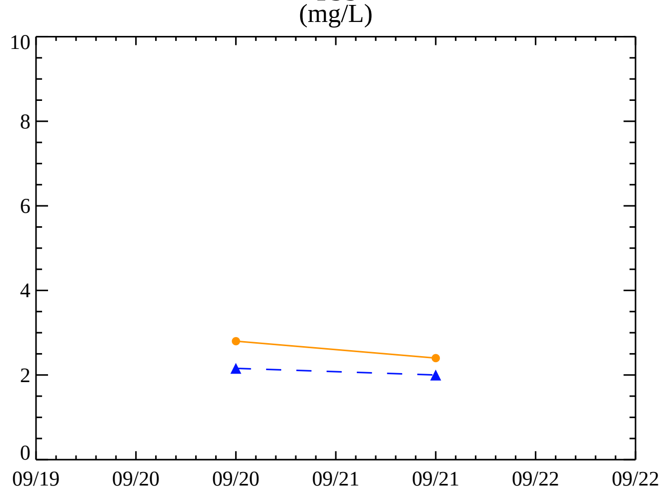
Daily Average Flow
(cfs)



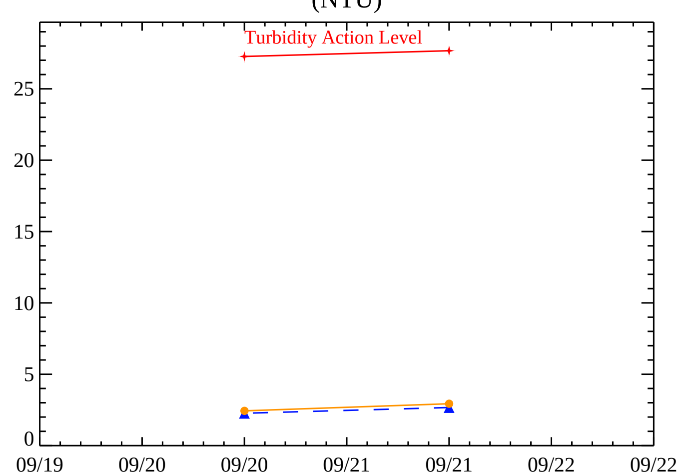
Total PCBs
(µg/L)



TSS
(mg/L)



Turbidity
(NTU)



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Wed May 16 10:10:12 2007

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/22/2006

Construction Activities: silt curtain installation

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS1: --- ACPS2: --- ACPS3: --- WCT46: no

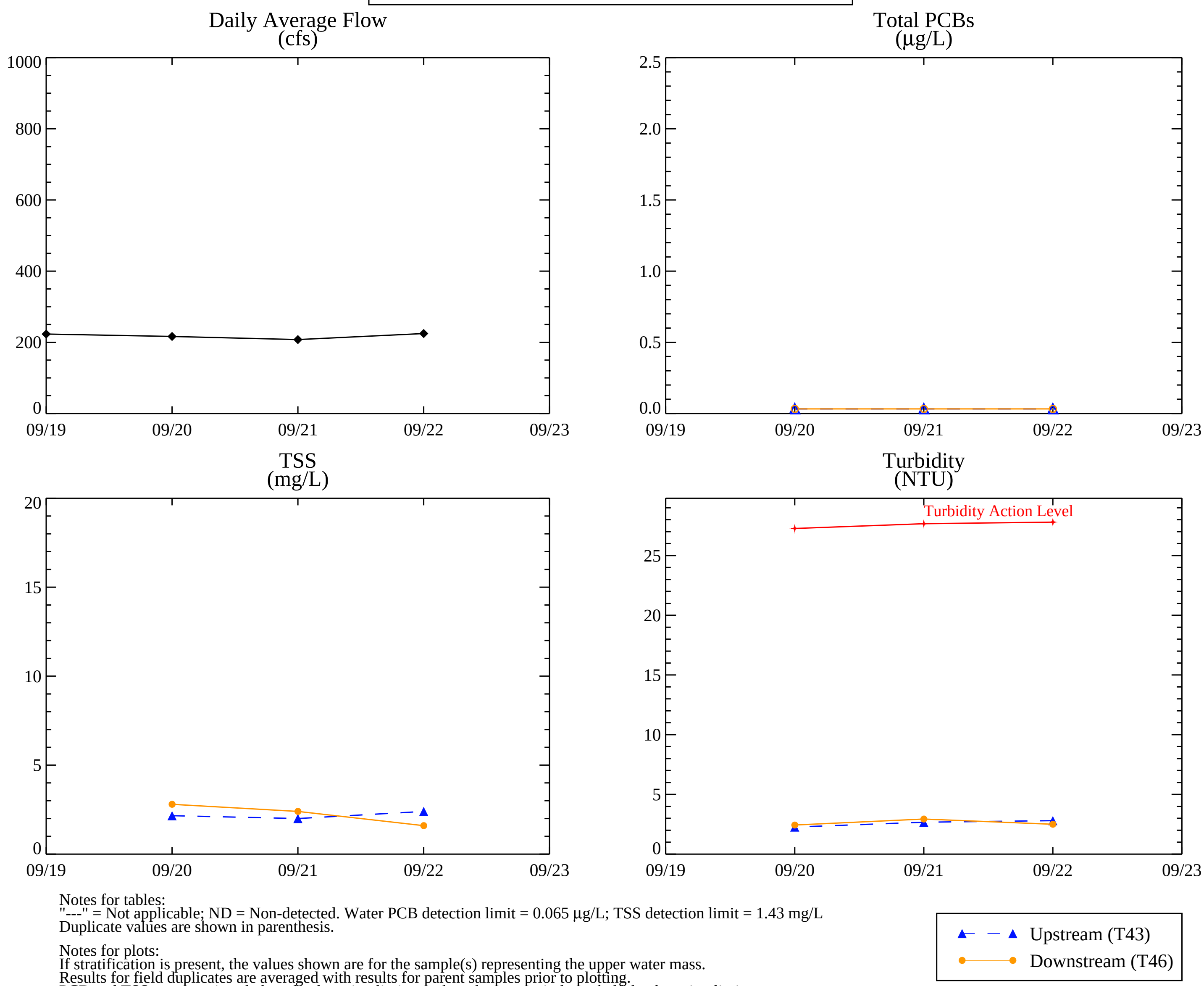
Mean Flow (cfs): 225

If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

Parameter	UPSTREAM WCT43	LOCAL ACPS1	LOCAL ACPS2	LOCAL ACPS3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	---	---	---	---	ND	---
TSS (mg/L)	2.40	---	---	---	---	1.60	---
Turbidity (NTU)	2.8	---	---	---	3.0	2.5	no

***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Tue Sep 26 11:27:32 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/25/2006

Construction Activities: Carbon application in initial testing area -mixed treatment area

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

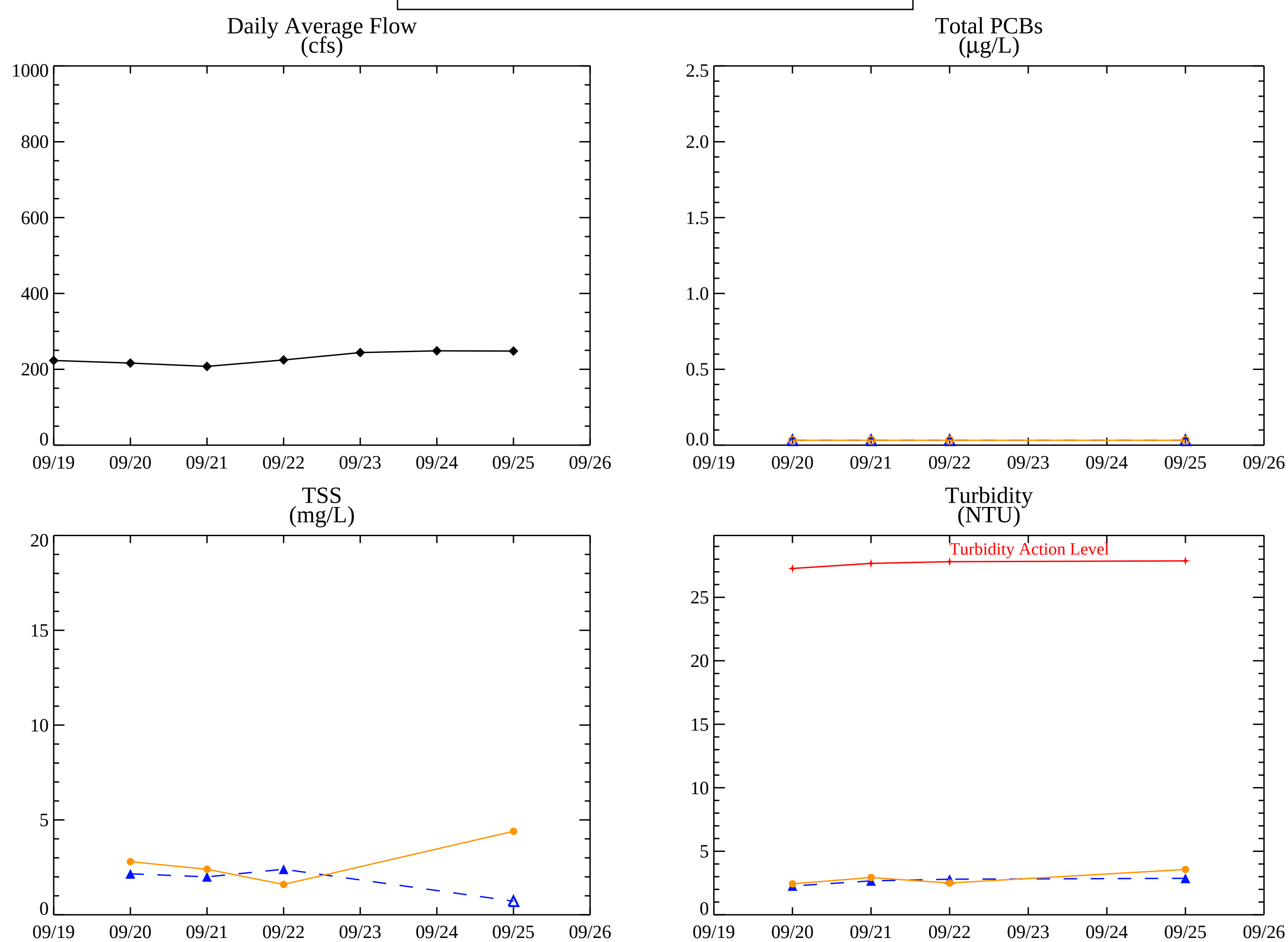
Mean Flow (cfs): 248

If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	ND	3.60	4.00	4.00	---	4.40	---
Turbidity (NTU)	2.9	3.7	4.1	4.1	4.6	3.6	no

***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Wed Sep 27 14:40:18 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/26/2006

Construction Activities: Application of carbon in initial testing area - tiller mixed/unmixed

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

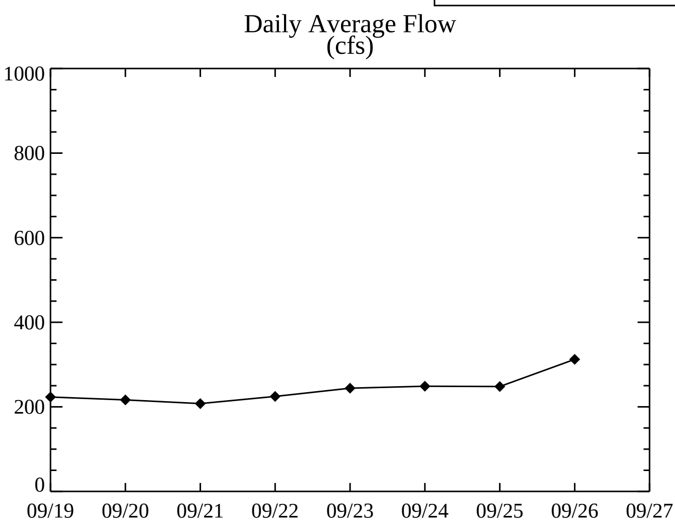
Mean Flow (cfs): 312

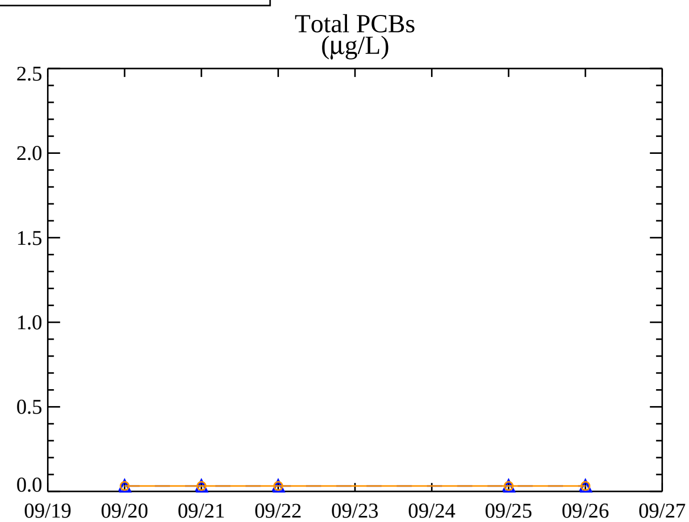
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

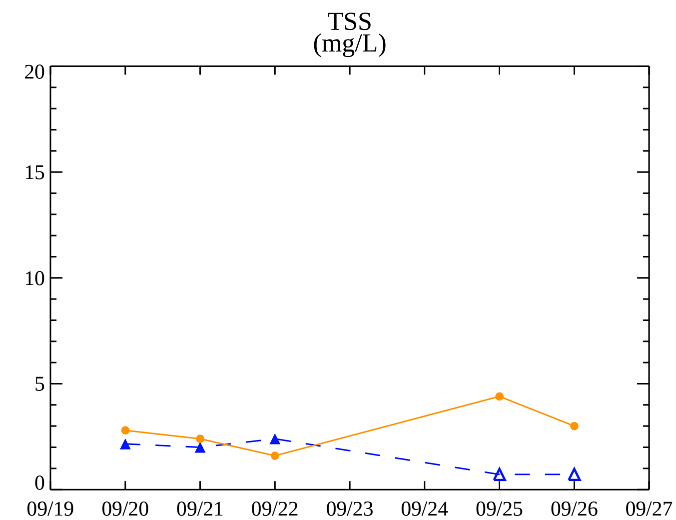
	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND (ND)	---
TSS (mg/L)	ND	3.60	3.20	4.40	---	2.80 (3.20)	---
Turbidity (NTU)	2.8	3.8	3.5	3.4	4.0	3.3	no

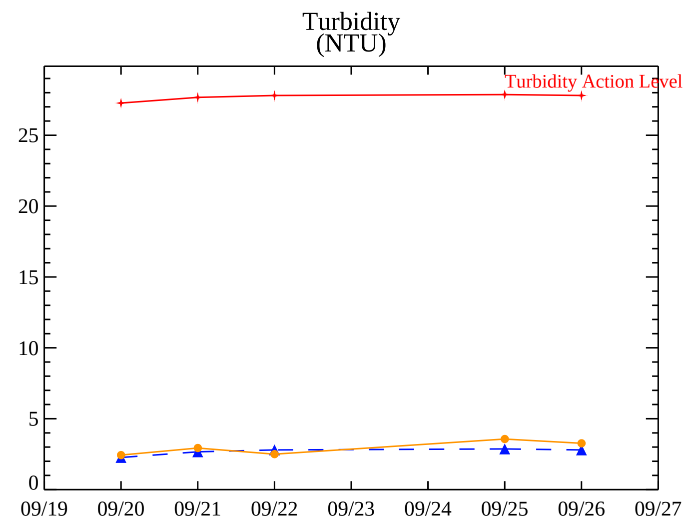
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA



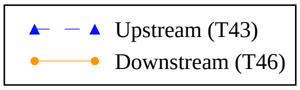






Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.



Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Thu Sep 28 11:01:38 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/27/2006

Construction Activities: Application in the initial testing area - tine sled

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

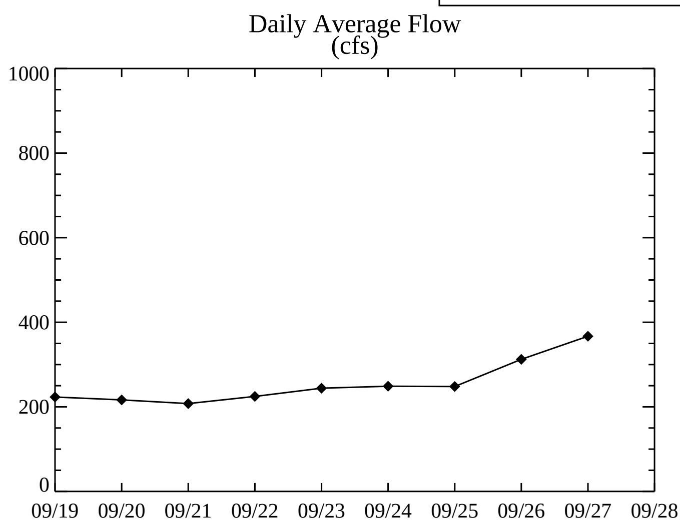
Mean Flow (cfs): 367

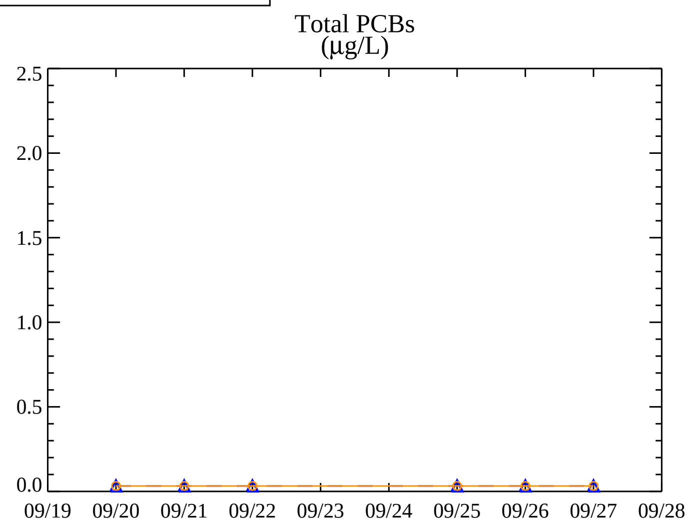
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

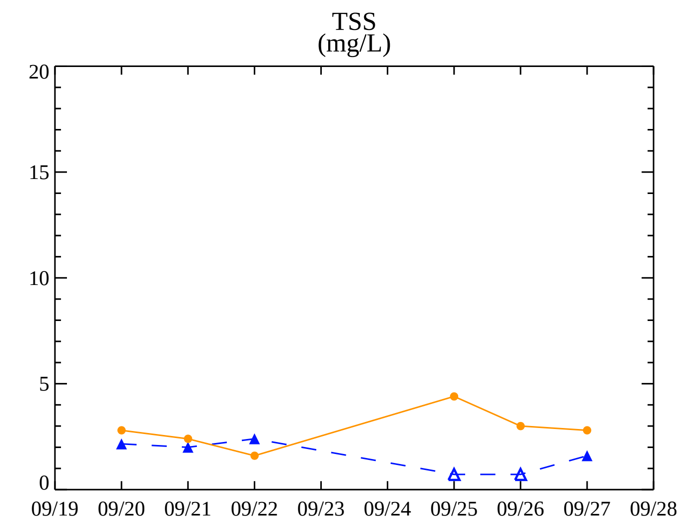
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	1.60	2.80	ND	2.40	---	2.80	---
Turbidity (NTU)	2.9	3.1	3.5	2.7	3.5	2.9	no

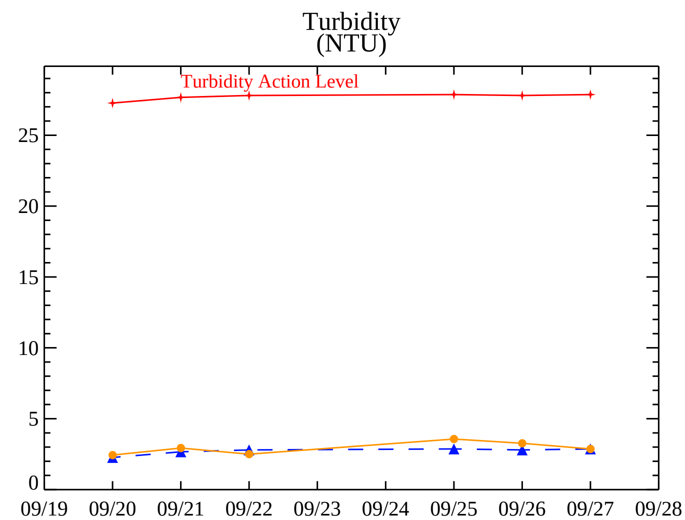
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Fri Sep 29 10:01:19 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/28/2006

Construction Activities: Complete silt curtain installation and application in the initial testing area - tine sled area

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

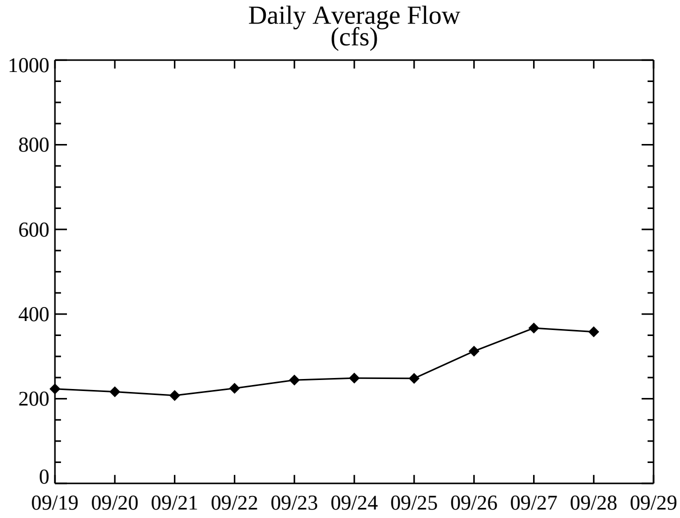
Mean Flow (cfs): 358

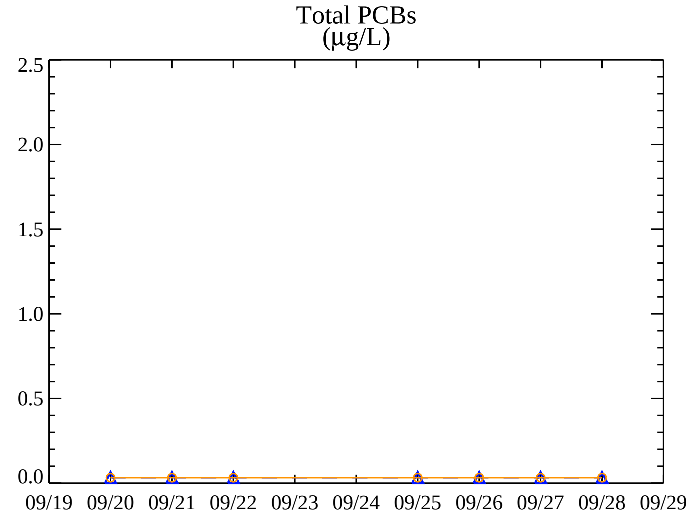
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

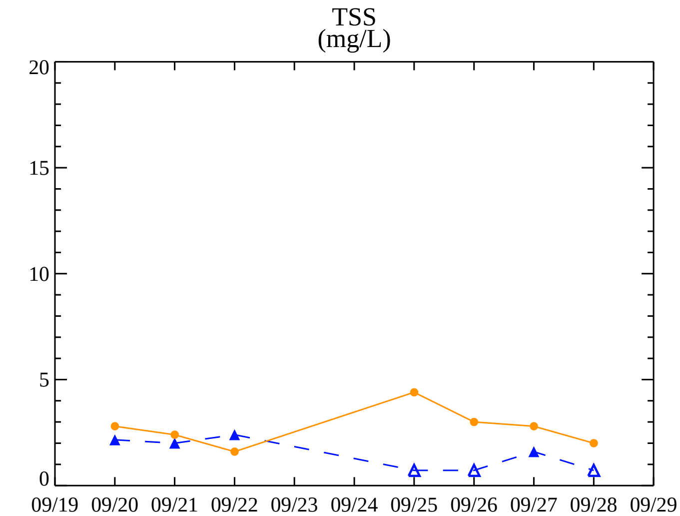
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	ND	1.60	2.00	2.00	---	2.00	---
Turbidity (NTU)	2.8	3.0	3.0	2.9	3.3	3.0	no

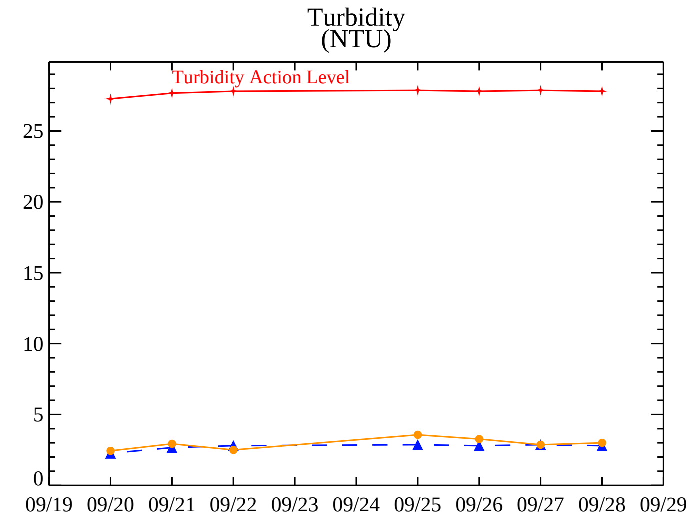
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Mon Oct 02 11:51:26 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 9/29/2006

Construction Activities: Application in initial testing area - roto-tiller

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

Mean Flow (cfs): 528

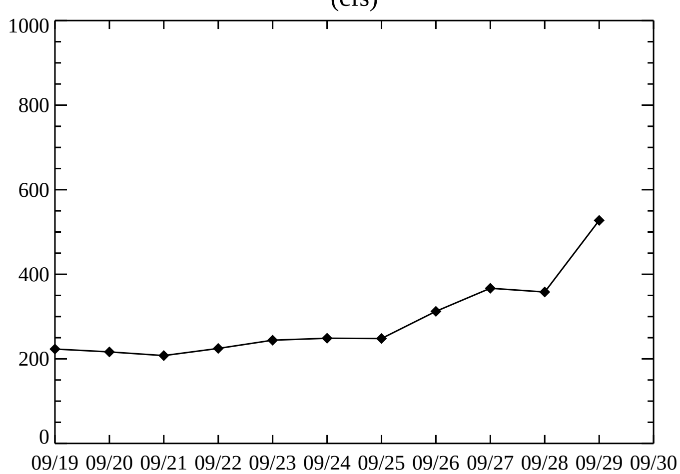
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	2.00	1.60	3.60	2.40	---	3.20	---
Turbidity (NTU)	0.4	1.0	0.8	0.9	0.8	0.5	no

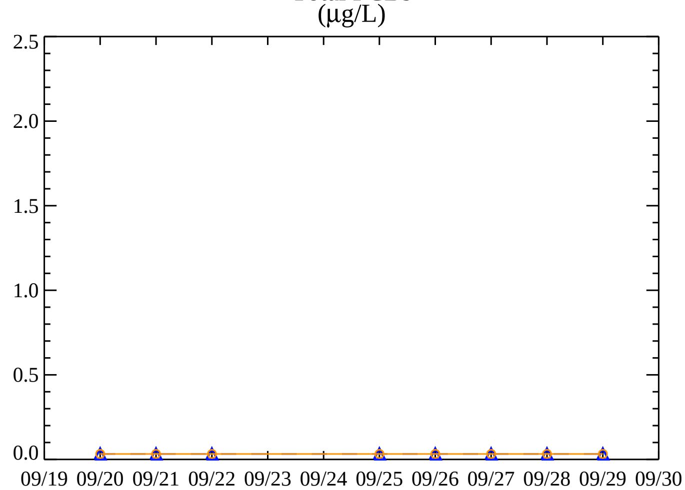
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA

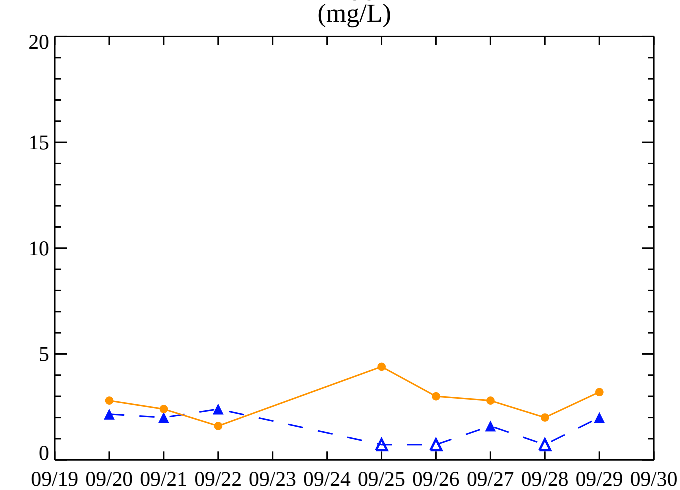
Daily Average Flow
(cfs)



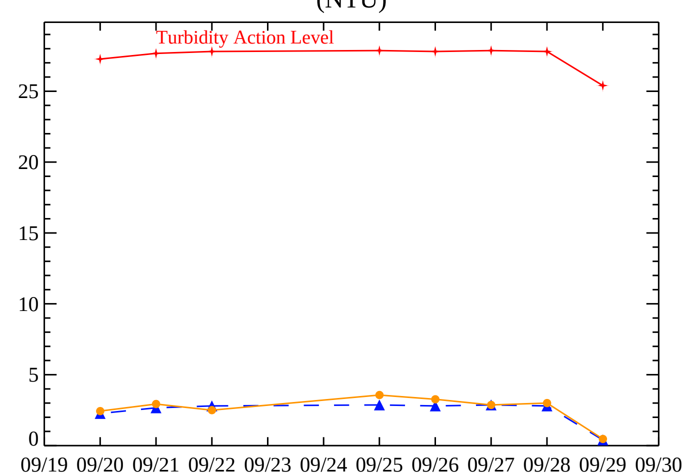
Total PCBs
(µg/L)



TSS
(mg/L)



Turbidity
(NTU)



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Tue Oct 03 11:35:45 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/2/2006

Construction Activities: Application in initial testing area - roto-tiller

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

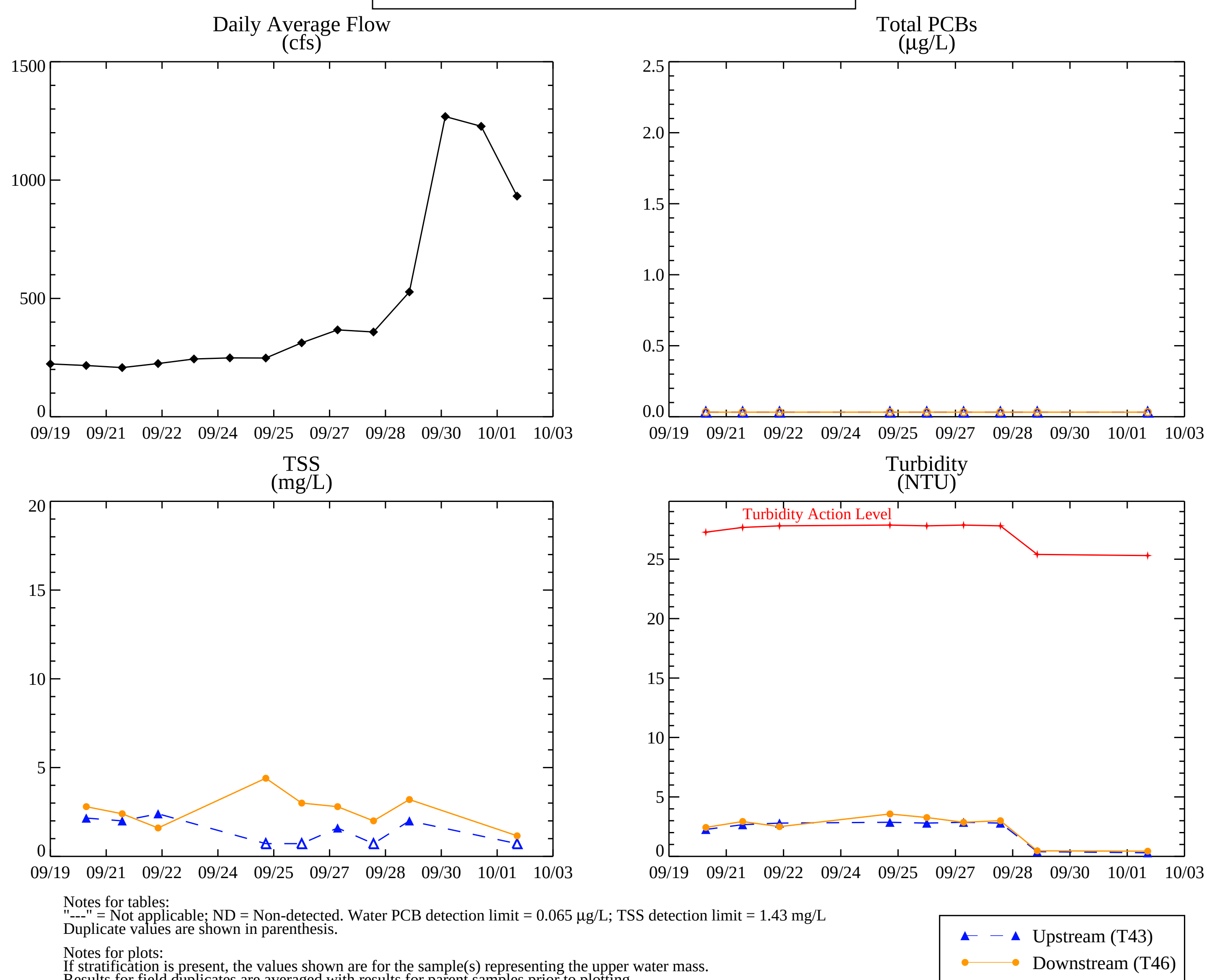
Mean Flow (cfs): 932

If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND (ND)	---
TSS (mg/L)	ND	ND	ND	ND	---	ND (1.60)	---
Turbidity (NTU)	0.3	0.6	0.5	0.5	0.6	0.4	no

***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentrations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Wed Oct 04 10:59:06 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/3/2006

Construction Activities: MTL AREA

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

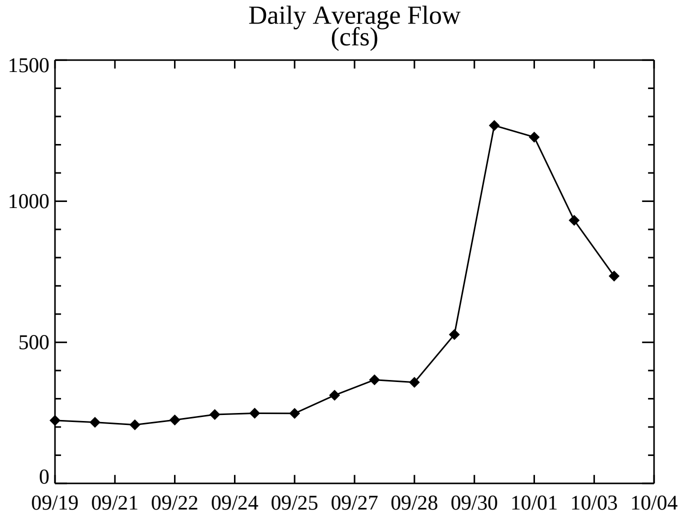
Mean Flow (cfs): 735

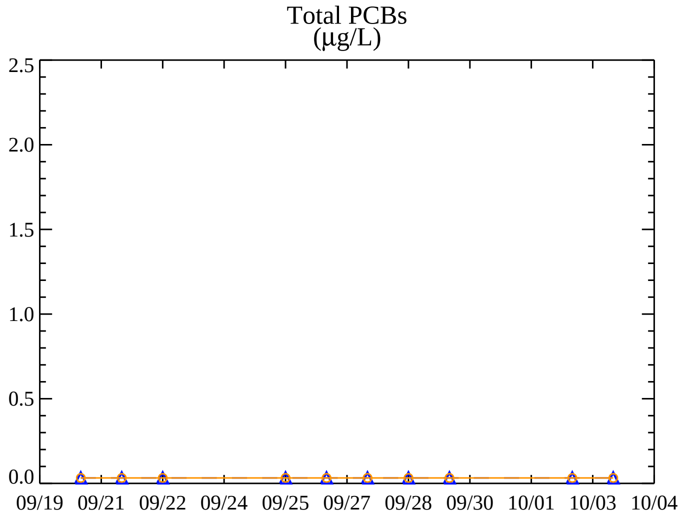
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

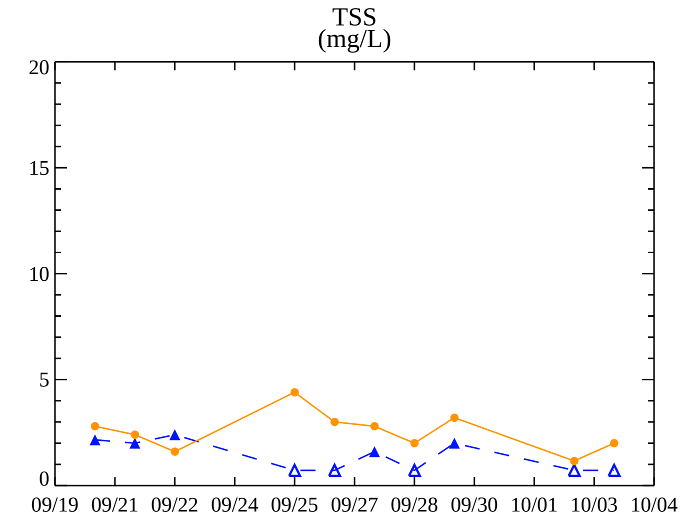
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	ND	2.00	ND	ND	---	2.00	---
Turbidity (NTU)	0.4	0.7	1.3	1.2	0.6	0.6	no

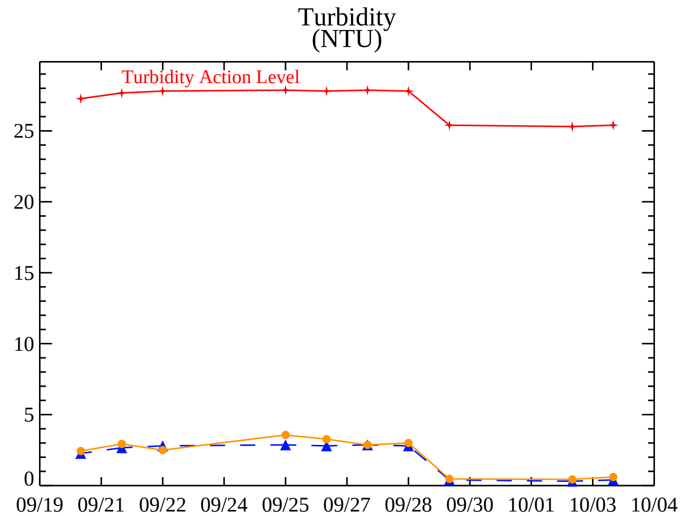
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Thu Oct 05 09:37:28 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/4/2006

Construction Activities: Application in mixed treatment area.

Comments: N/A

Water Column Data

Mean Flow (cfs): 589

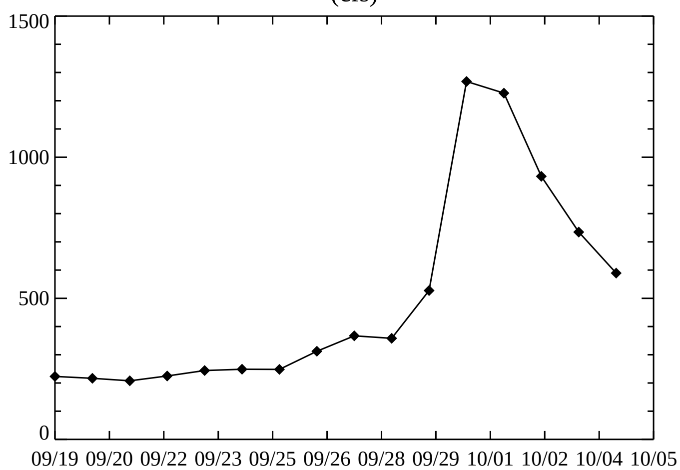
Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

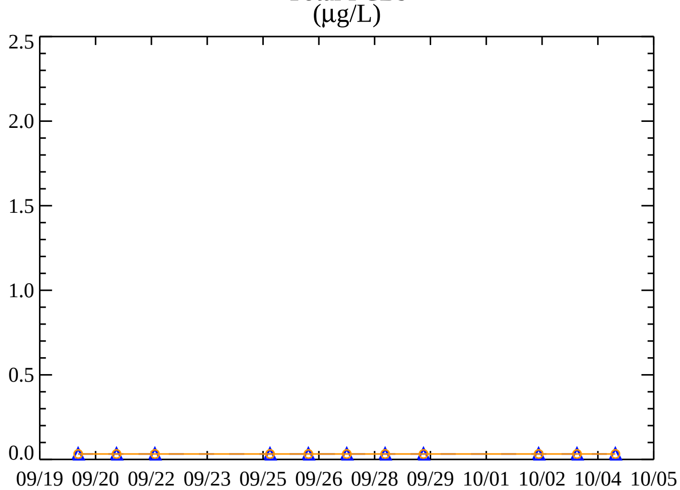
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

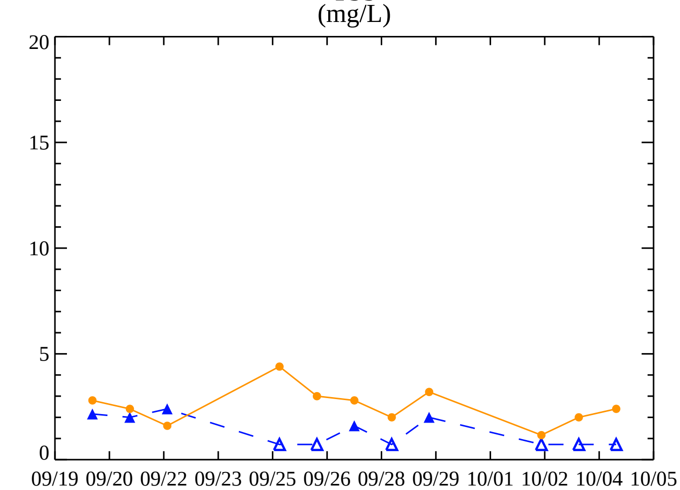
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	ND	1.60	2.00	1.60	---	2.40	---
Turbidity (NTU)	0.4	0.6	0.6	0.9	0.4	0.4	no

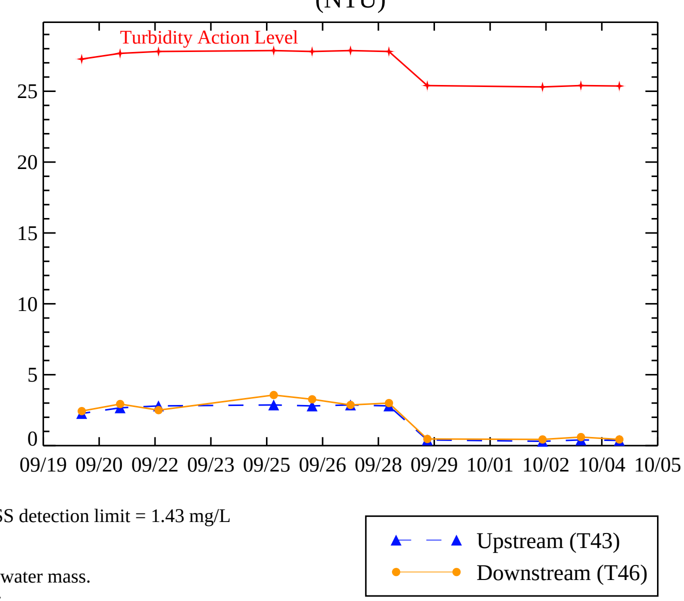
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Fri Oct 06 10:00:54 2006

DAILY SUMMARY FOR: 10/5/2006

Construction Activities: Continuing of application in mixed treatment area.

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

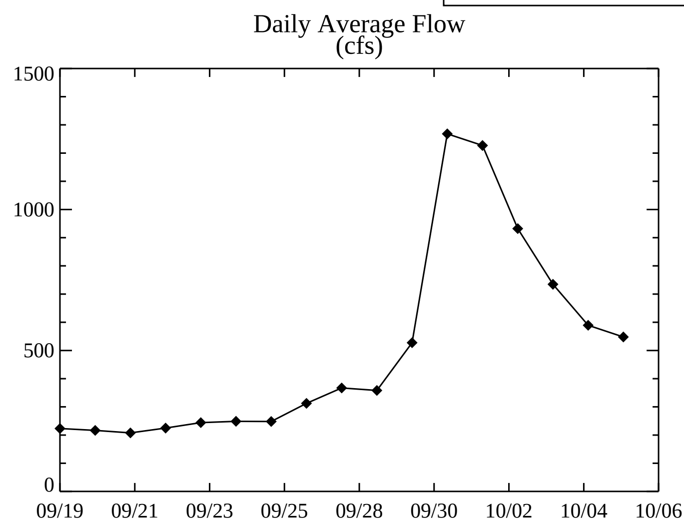
Mean Flow (cfs): 548

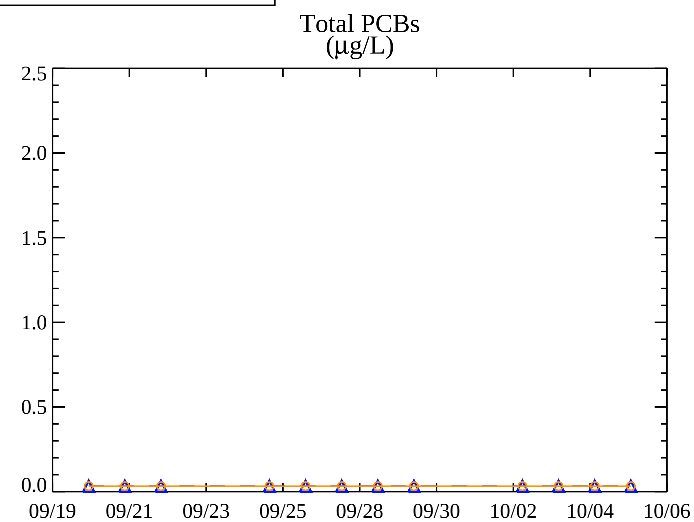
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

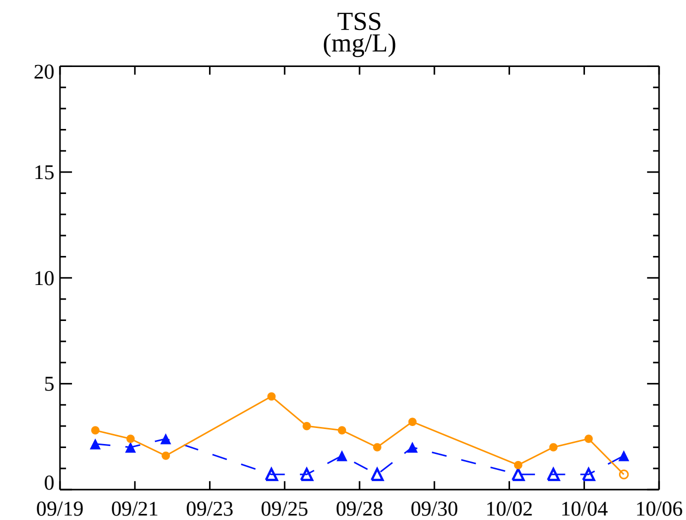
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	1.60	2.80	2.40	2.40	---	ND	---
Turbidity (NTU)	1.1	1.1	1.2	1.4	1.2	1.3	no

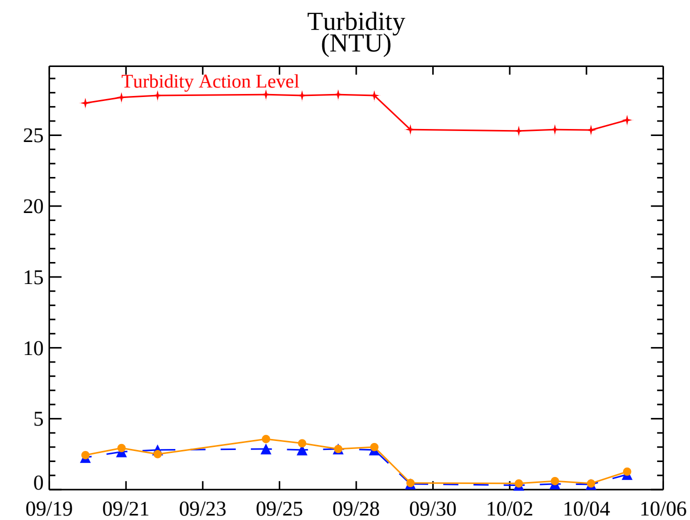
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Mon Oct 09 09:56:15 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/6/2006

Construction Activities: Application in the mixed treatment area

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

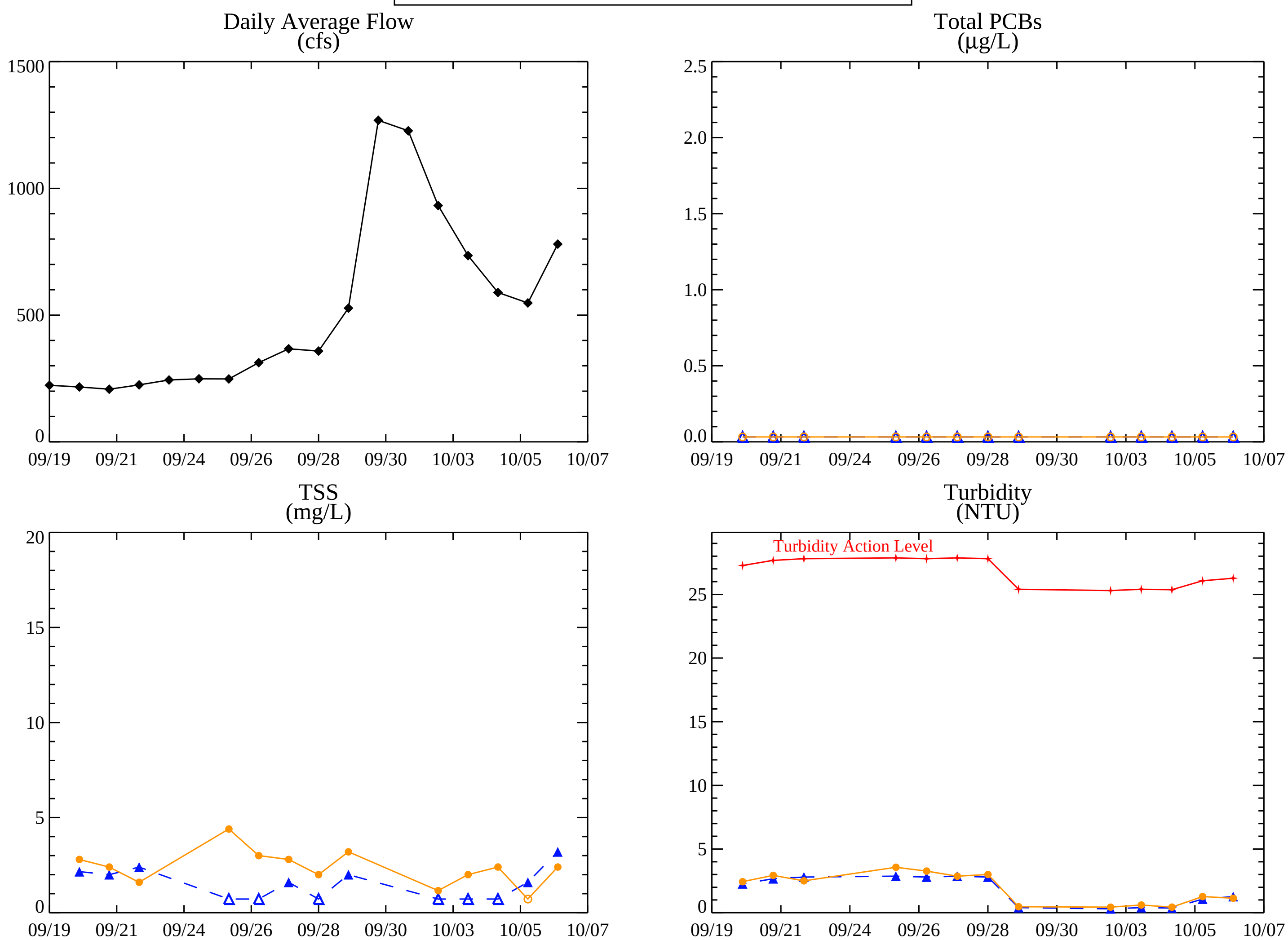
Mean Flow (cfs): 780

If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND (ND)	---
TSS (mg/L)	3.20	2.40	2.40	2.40	---	3.20 (1.60)	---
Turbidity (NTU)	1.3	1.5	1.4	1.3	1.5	1.1	no

***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Tue Oct 10 09:38:15 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/9/2006

Construction Activities: Application of carbon.

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

Mean Flow (cfs): 471

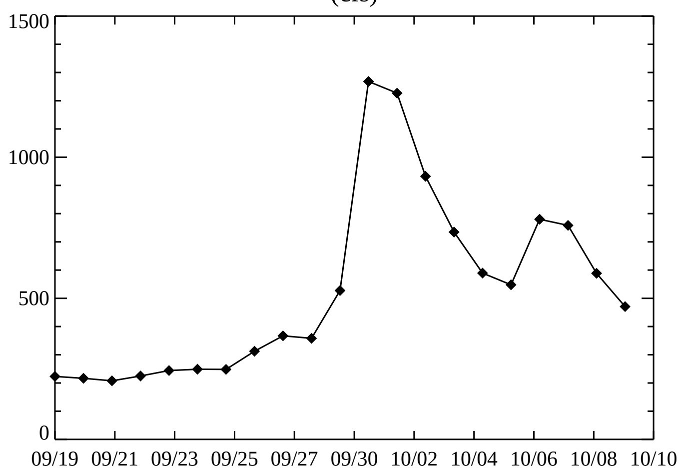
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	ND	2.80	3.20	4.40	---	1.60	---
Turbidity (NTU)	0.9	1.3	1.6	1.2	1.2	1.0	no

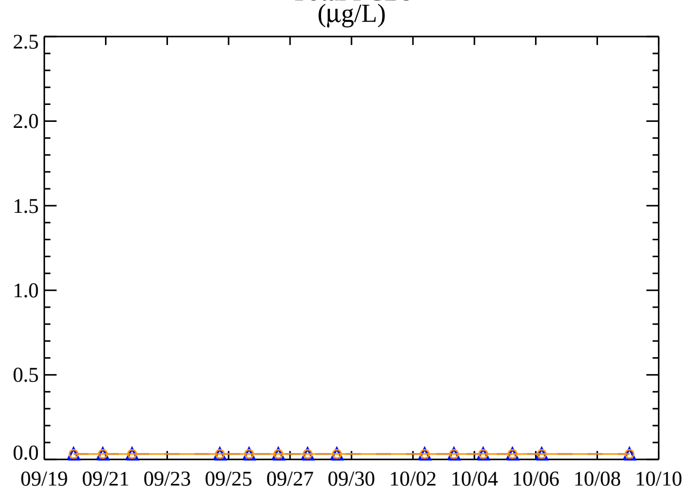
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA

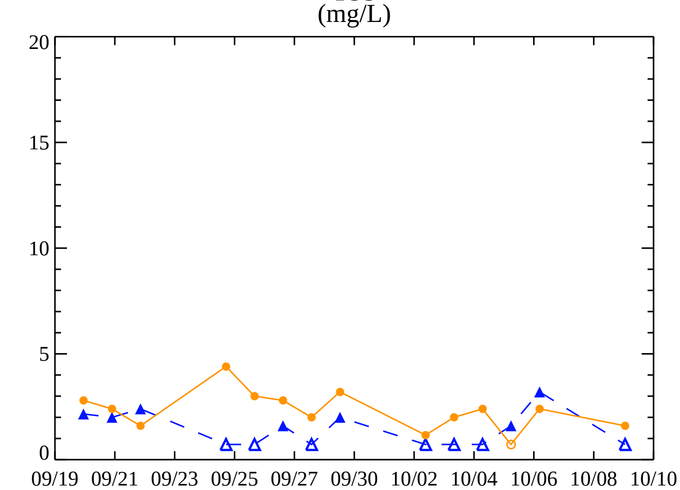
Daily Average Flow
(cfs)



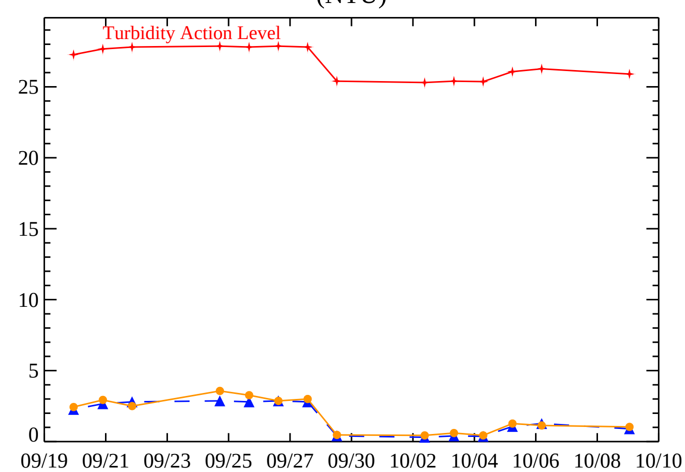
Total PCBs
(µg/L)



TSS
(mg/L)



Turbidity
(NTU)



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentrations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Wed Oct 11 11:40:29 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/10/2006

Construction Activities: Application of carbon in mixed tiller area.

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

Mean Flow (cfs): 394

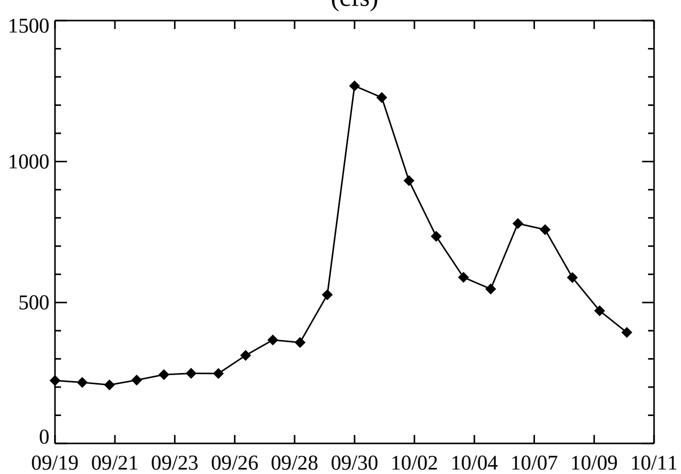
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

	UPSTREAM	LOCAL			DOWNSTREAM		
Parameter	WCT43	ACPS-1	ACPS-2	ACPS-3	WCT46* Northern	WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	ND	2.40	2.00	2.00	---	2.00	---
Turbidity (NTU)	1.1	1.5	1.8	1.9	1.5	1.4	no

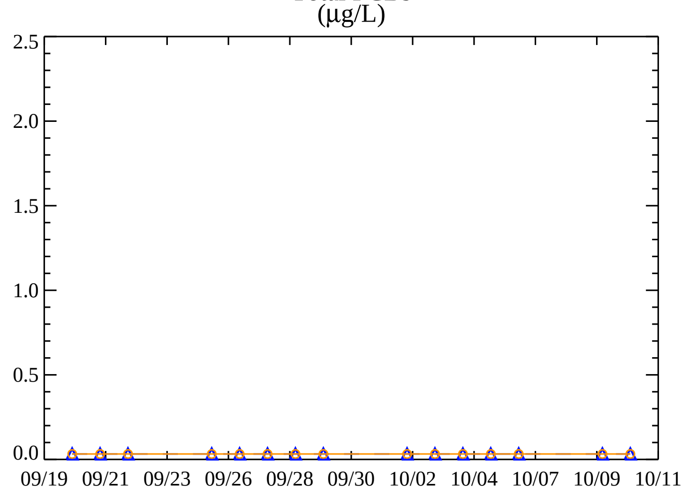
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA

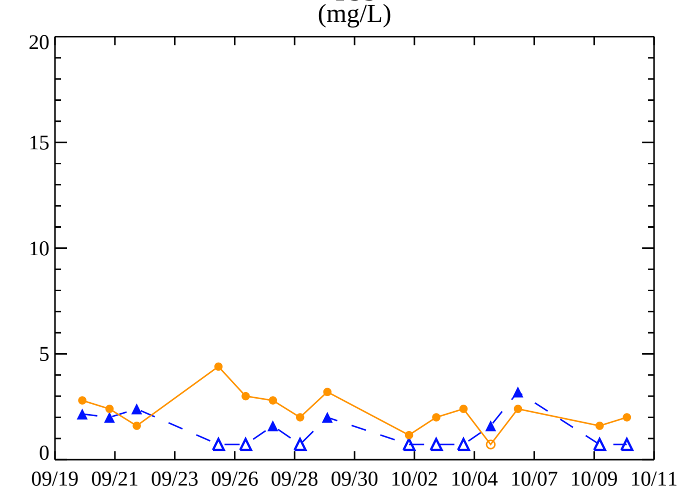
Daily Average Flow
(cfs)



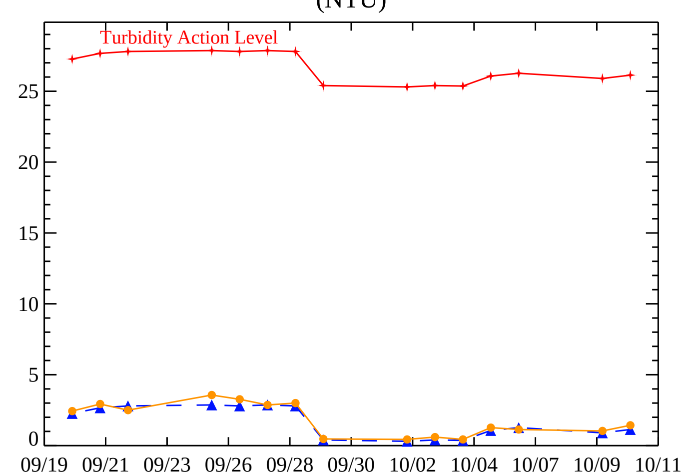
Total PCBs
(µg/L)



TSS
(mg/L)



Turbidity
(NTU)



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentrations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Thu Oct 12 09:38:56 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/11/2006

Construction Activities: Application of in the tiller unmixed area.

Comments: N/A

Water Column Data Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

Mean Flow (cfs): 362

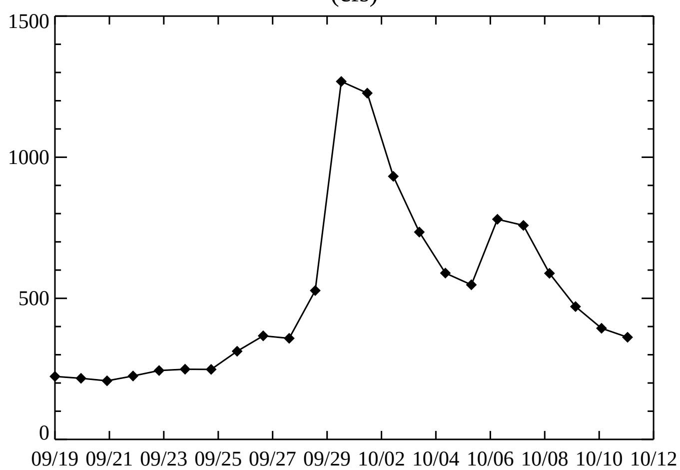
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	ND	ND	1.60	2.00	---	1.60	---
Turbidity (NTU)	1.3	1.3	1.5	1.5	---	1.5	no

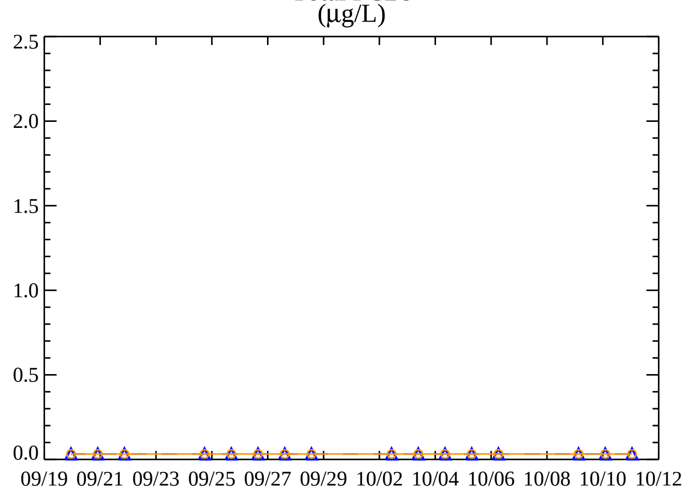
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA

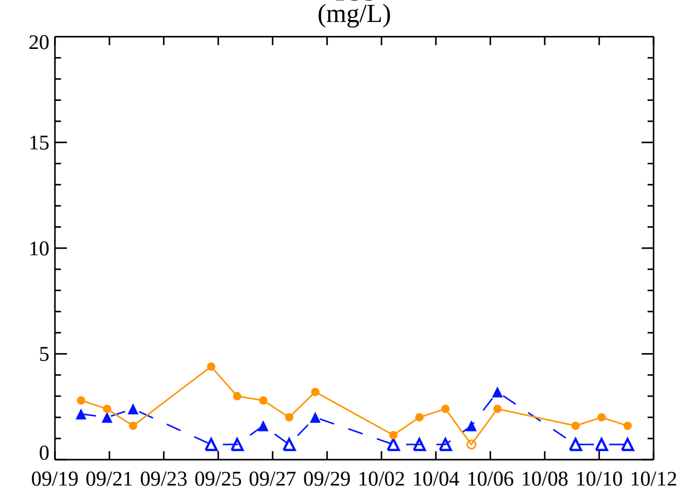
Daily Average Flow (cfs)



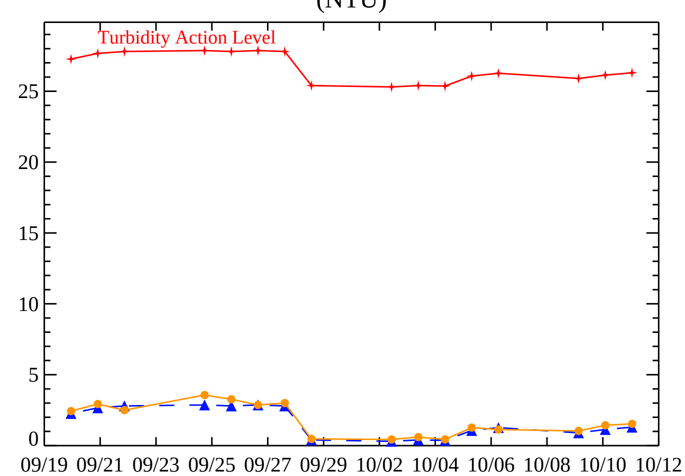
Total PCBs (µg/L)



TSS (mg/L)



Turbidity (NTU)



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentrations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Fri Oct 13 10:46:45 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/12/2006

Construction Activities: Application of carbon in unmixed tiller and sled areas.

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

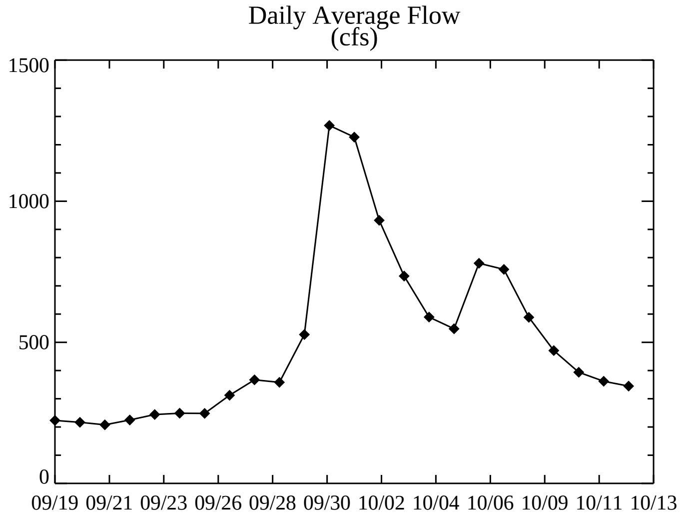
Mean Flow (cfs): 345

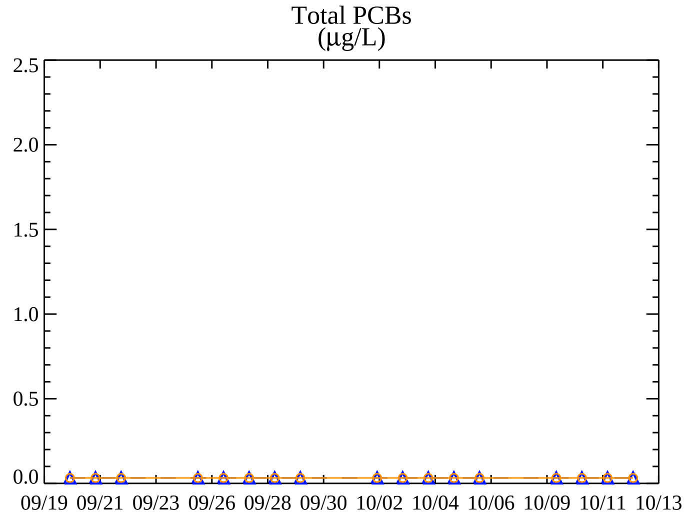
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

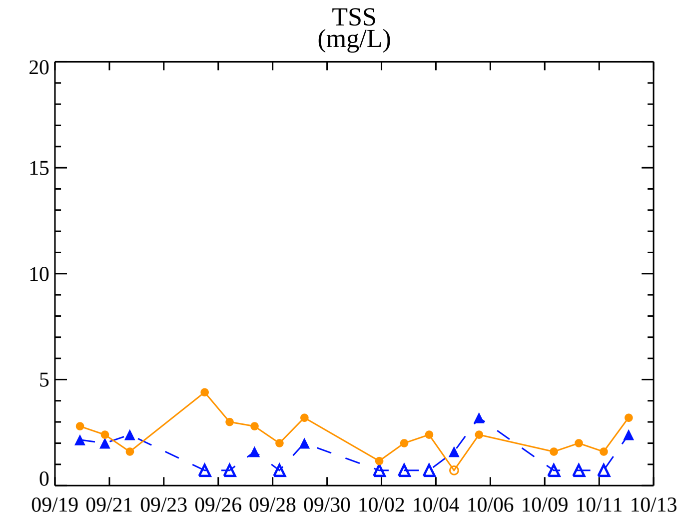
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND (ND)	---
TSS (mg/L)	2.40	2.00	2.00	5.20	---	4.40 (2.00)	---
Turbidity (NTU)	0.9	1.1	1.5	2.1	1.4	1.3	no

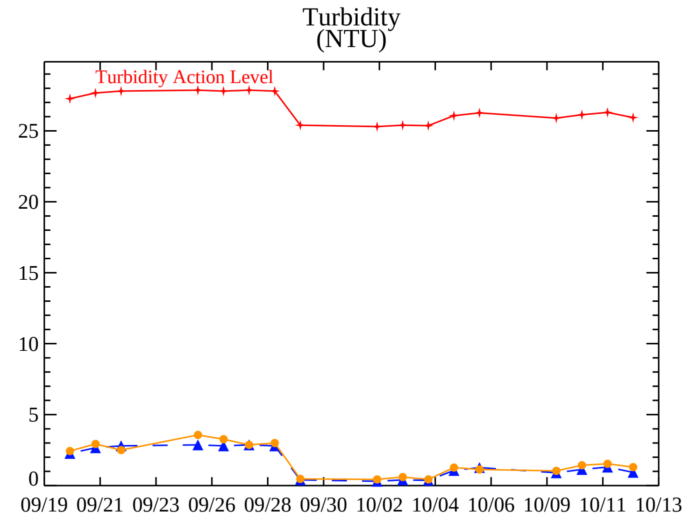
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Mon Oct 16 11:04:39 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/13/2006

Construction Activities: Application of carbon in sled area

Comments: N/A

Water Column Data Stratification Present: WCT43: no ACPS-1: no ACPS-2: no ACPS-3: no WCT46: no

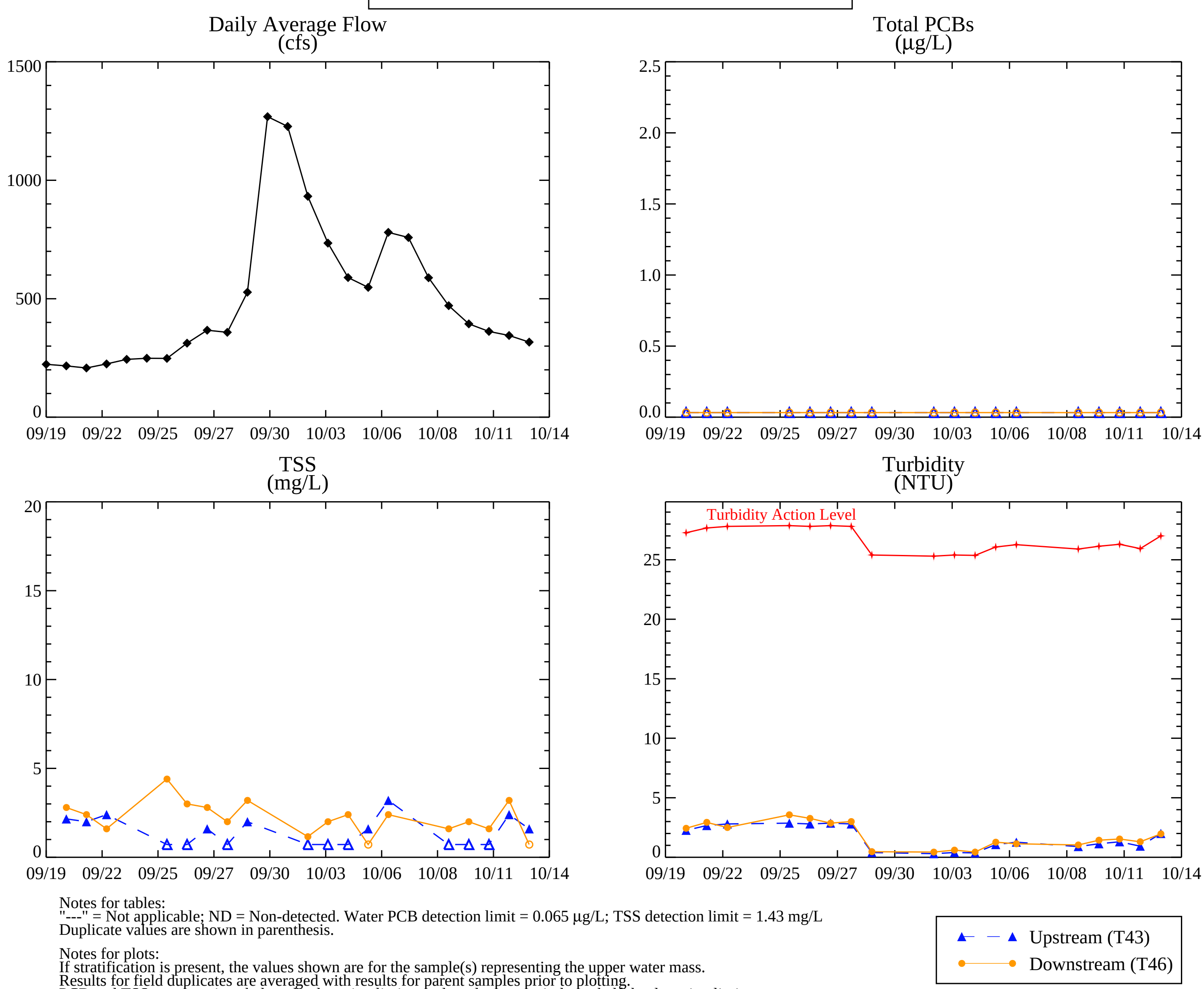
Mean Flow (cfs): 317

If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	ND	ND	ND	---	ND	---
TSS (mg/L)	1.60	1.60	5.20	4.00	---	ND	---
Turbidity (NTU)	2.0	1.8	2.3	2.2	1.9	2.0	no

***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA



Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Tue Oct 17 11:09:03 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/14/2006

Construction Activities: Silt curtain removal and demob.

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: --- ACPS-2: --- ACPS-3: --- WCT46: no

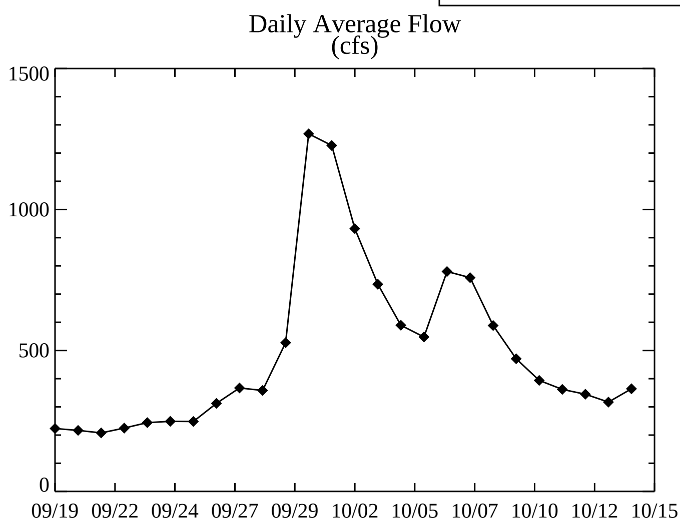
Mean Flow (cfs): 364

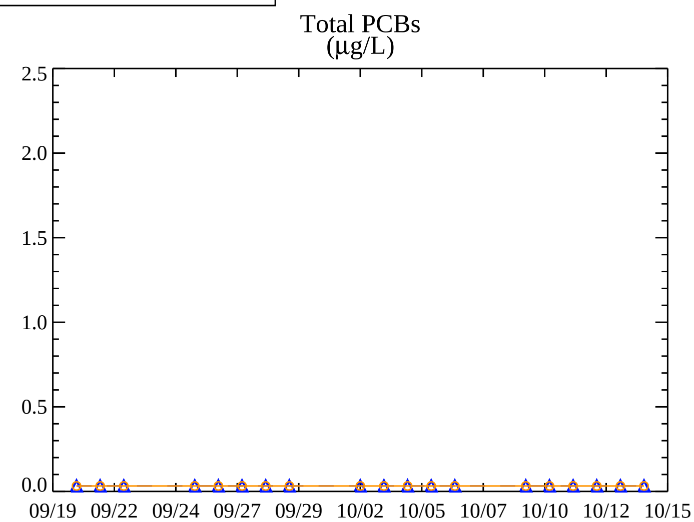
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

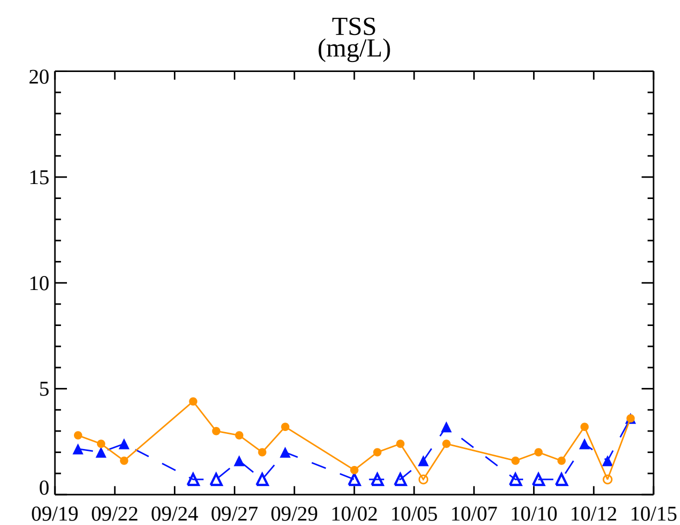
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	---	---	---	---	ND	---
TSS (mg/L)	3.60	---	---	---	---	3.60	---
Turbidity (NTU)	1.7	---	---	---	2.0	2.1	no

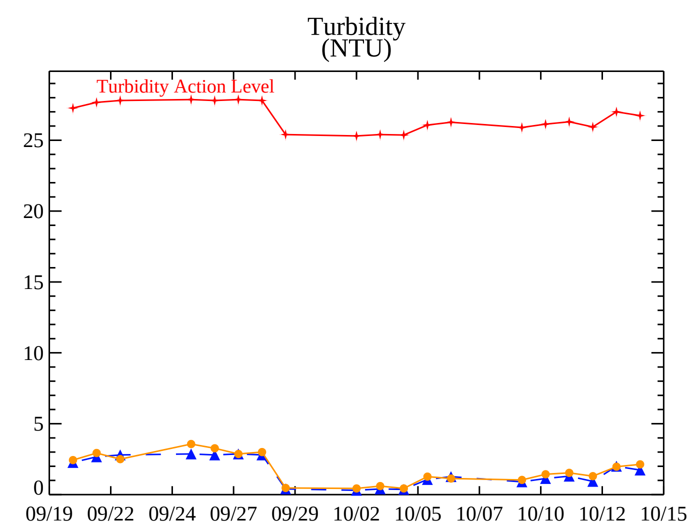
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Upstream (T43)
Downstream (T46)

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Wed Oct 18 10:52:13 2006

Water Column Data Summary
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

DAILY SUMMARY FOR: 10/16/2006

Construction Activities: silt curtain and anchor removal

Comments: N/A

Water Column Data

Stratification Present: WCT43: no ACPS-1: --- ACPS-2: --- ACPS-3: --- WCT46: no

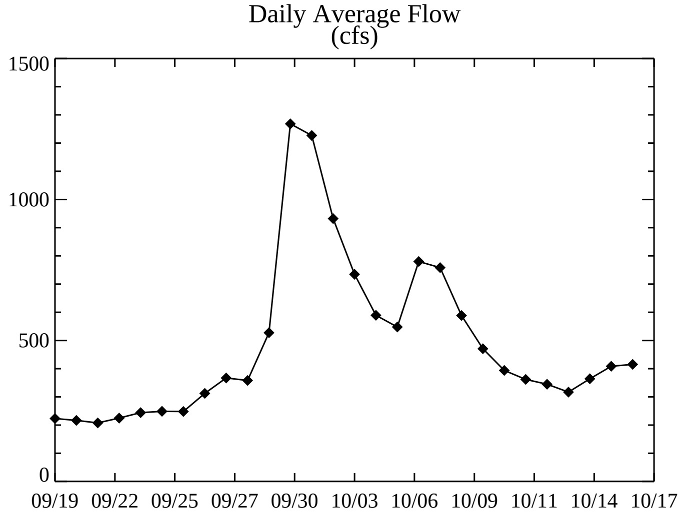
Mean Flow (cfs): 415

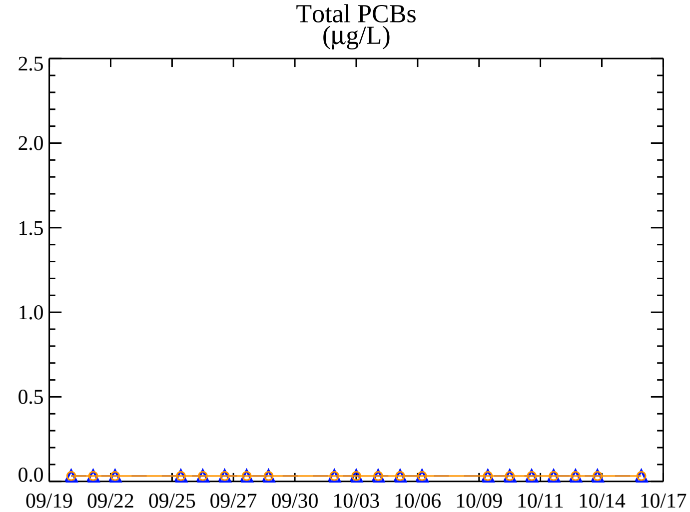
If stratification is present, the values reported in the table immediately below are for the sample(s) representing the upper water mass and the values reported in the lower table are for the sample(s) representing the lower water mass.

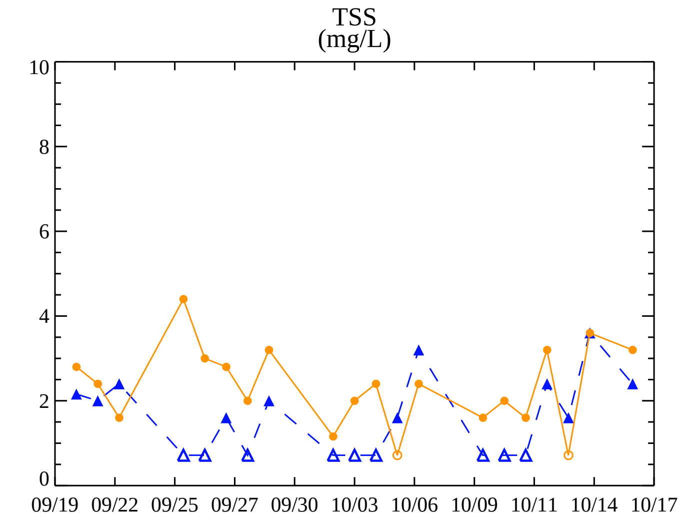
Parameter	UPSTREAM WCT43	LOCAL ACPS-1	LOCAL ACPS-2	LOCAL ACPS-3	DOWNSTREAM WCT46* Northern	DOWNSTREAM WCT46* Center	Needs Action?*
Total PCBs (µg/L)	ND	---	---	---	---	ND	---
TSS (mg/L)	2.40	---	---	---	---	3.20	---
Turbidity (NTU)	1.5	---	---	---	1.9	1.9	no

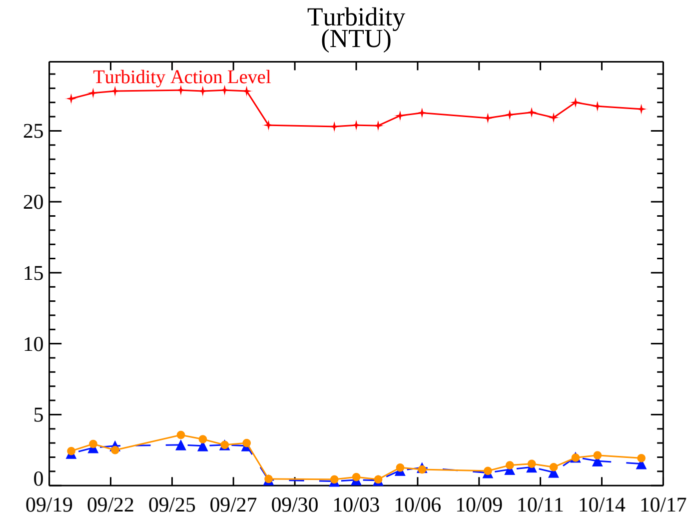
***Action Level Criteria:** **(apply only to T46 Center Channel)** Turbidity: > 25 NTU over background at downstream station (Downstream reading minus upstream reading)
Turbidity readings collected at northern and central points along the downstream transect. Only center-channel data are used for action levels and plots below.

SUMMARY OF ACPS WATER COLUMN DATA









Upstream (T43)
Downstream (T46)

Notes for tables:
"---" = Not applicable; ND = Non-detected. Water PCB detection limit = 0.065 µg/L; TSS detection limit = 1.43 mg/L
Duplicate values are shown in parenthesis.

Notes for plots:
If stratification is present, the values shown are for the sample(s) representing the upper water mass.
Results for field duplicates are averaged with results for parent samples prior to plotting.
PCB and TSS concentations below the detection limit are plotted as open circles at half the detection limit.
Flows based on data from USGS gage at Chase Mills.

Data have not yet been verified and are provisional.

ARC - D:\ALCgra\Analysis\ACPS\IDL\ACPS_monitoring\water_column\ACPS_water_daily_data.pro
Thu Oct 19 09:52:09 2006

APPENDIX B

ACPS COMMUNITY UPDATE MAILER

Activated Carbon Pilot Study
Grasse River Study Area
Massena, New York

September 2006

Alcoa to Conduct Activated Carbon Pilot Study

Alcoa Inc., with oversight from the US Environmental Protection Agency (EPA), will conduct a study in the fall of 2006 to evaluate the effectiveness of applying and mixing activated carbon in the lower Grasse River sediments downstream from its Massena West Plant. Throughout the project, Alcoa has been researching and evaluating new technologies for remediation, and promising results obtained through laboratory testing work indicate that this approach merits a pilot study. The technology proposed for this pilot study consists of adding activated carbon to the upper layer of the sediments and monitoring over a multi-year period to determine effectiveness. Work at the site will begin in September and continue through October of this year. This fact sheet presents a summary of the activated carbon pilot study and includes information relating to community health and safety during the study.

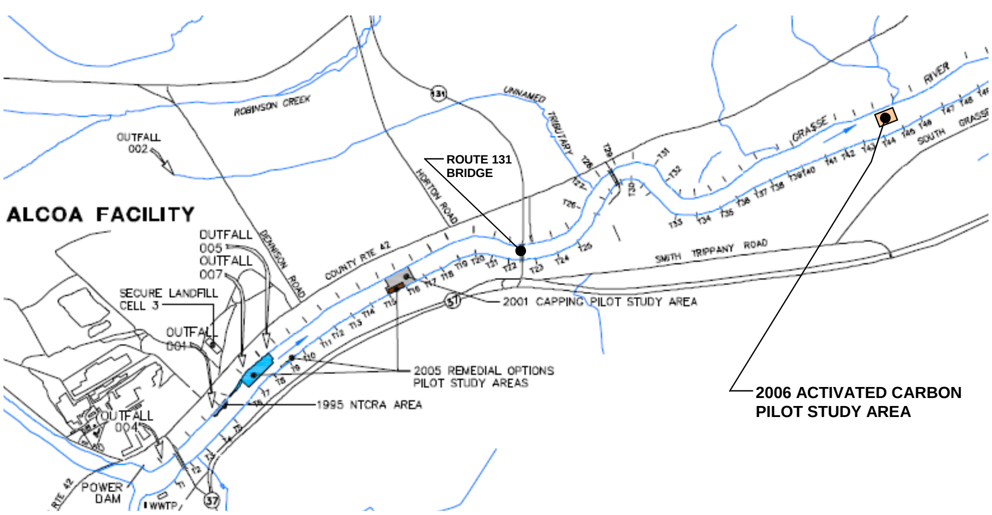
Why Carbon?

The lower Grasse River is currently under a fish consumption advisory from the New York State Department of Health due to elevated polychlorinated biphenyl (PCB) levels found in fish. Results from previous Grasse River investigations indicate that the major source of PCBs to Grasse River fish is from the river sediments. Sources to the river sediments have been controlled through remediation efforts at the Massena West Plant (see September 2006 Superfund Program Update).

Activated Carbon

Carbon is widely used to treat drinking water and, in fact, is used at the Massena plants to remove PCBs from Alcoa's river discharges. Several recent laboratory studies have shown that the addition of activated carbon to sediments can reduce the bioavailability of PCBs in sediments to fish and other river-dwelling organisms. The carbon dose is not toxic to humans, fish, or other organisms. The PCBs sorb onto the carbon particles and become trapped, making them unavailable to the fish. This, in turn, is expected to result in the reduction of PCB levels in both water and fish of the lower Grasse River. Only a thin layer of carbon is necessary to achieve this result.

Study Area Location and Application Techniques



The activated carbon pilot study (ACPS) will be performed in an approximate 0.5-acre area located in the main channel of the lower Grasse River approximately 2 miles downstream of the Route 131 bridge. A silt curtain will be used on the downstream and center channel sides of the in-river work area to control carbon from leaving the work site.

The ACPS area will be divided into three separate test plots to evaluate different application techniques and mixing methods. The application techniques were developed over a several month period and were tested on land at the

Contractor's facility prior to use in a river setting. The two application techniques that will be tested include: 1) a "roto-tiller;" and 2) a "tine sled."


Roto-tiller


Tine Sled

Both pieces of equipment have several nozzles to inject the carbon slurry (carbon mixed with water) to the sediments. The roto-tiller has the ability to mix the carbon into the top few inches of sediment via several rotating tines. It also can be used to simply inject the carbon without mechanical mixing. In this case, microscopic benthic organisms that live in the sediment would mix the carbon into the sediment over time. Carbon mixing with the tine sled occurs through the use of several "fingers" that extend into the sediment as the sled is dragged along the river bottom. Both pieces of equipment are enclosed and covered (not shown in the tine sled pictured above) to reduce the amount of disturbance from the mixing operation.

Monitoring will be performed prior to the study to determine baseline conditions, during the study to evaluate the application process, and over time after the study to determine the effectiveness of the carbon in reducing PCB availability in the sediments. Monitoring will consist of the collection of water, sediment, and benthic organisms.

Community Health and Safety During the Study

Construction activities during the study are expected to take place during daylight hours, five days per week (excluding weekends) over September and October. As a result, a variety of health and safety issues must be anticipated, and measures taken to minimize impacts to the community. Throughout the study, Alcoa will evaluate water quality, noise levels, impacts on recreational boating, and site security. If monitoring activities indicate a potential concern, Alcoa and EPA will work together to address the issue as quickly as possible.

- ***Water Quality:*** Water quality will be monitored daily at several locations upstream, adjacent to, and downstream of the work area. Samples will be collected from multiple depths within the water column and analyzed for PCBs and total suspended solids along with turbidity (a measure of water clarity).
- ***Noise Levels:*** Noise levels will be assessed throughout the study. Sounds associated with the operation of heavy equipment will be controlled to the extent possible. Since activities will be performed during daylight hours, nuisance noise is expected to be minimal.
- ***Recreational Boating:*** Boaters may encounter working vessels/barges and other equipment associated with study-related activities. Navigation in an area along the river's southern shore will remain unrestricted throughout the project, and efforts will be taken to promote public safety and awareness. The U.S. Coast Guard and the U.S. Border Patrol will be notified. A no-wake zone will be established near the work area, lighted buoy and buoy markers will be placed on the river, and notices to recreational boaters will be posted at local marinas and other locations in the community.

- ***Site Security:*** Potential shore-based concerns will only exist within the confines of the Alcoa property, which is off-limits to the public. To prevent trespassing, vandalism, or accidental entry, site security measures will be employed. Unauthorized personnel will not be permitted to enter the site.

For More Information

If you would like additional information or want to be added to the project mailing list, please contact:

Young Chang (212) 637-4253
-EPA Remedial Project Manager
Larry McShea (724) 337-5458
-Alcoa Project Manager
Bruce Cook (315) 764-4270
-Alcoa Location Remediation Manager

EPA

ALCOA

APPENDIX C

ACPS PHASE 1 TECHNICAL MEMORANDA

APPENDIX C

ACPS PHASE 1 TECHNICAL MEMORANDA

REFERENCED MEMOS:

1) Summary of Activated Carbon Placement Equipment Development and Operations. August 30, 2006.
2) Summary of Phase 1 Supplemental Sampling of Upland Test Tanks and Phase 2 Sampling Plan. September 15, 2006.

GRASSE RIVER ACTIVATED CARBON PILOT STUDY

Summary of Activated Carbon Placement Equipment Development and Operations

This memorandum presents a detailed summary of the application and mixing equipment that Alcoa Inc. (Alcoa) has developed and plans to test for delivery of activated carbon (AC) in the lower Grasse River. This memorandum was prepared in response to comment G1 of the conditional approval letter from USEPA dated July 26, 2006 for the Activated Carbon Pilot Study (ACPS) Work Plan (Alcoa 2006).

As discussed in the ACPS Work Plan, the AC pilot study consists of two phases: 1) off-site land-based testing of various application and mixing techniques; and 2) in-river application and mixing of activated carbon to sediments in an approximate 0.5-acre portion of the lower Grasse River using the most effective application and mixing technique or techniques, as determined during the land-based testing.

Summary of Phase 1 Activities

The Phase 1 portion of this ACPS involved the design and fabrication of equipment specifically for the application of AC to the Grasse River. The equipment design was an iterative process through which refinements were made based on the input from Alcoa's technical design team during equipment development. Based on the results of the initial testing described below, the most effective application and mixing techniques involve the use of either "roto-tiller" or "tine sled" equipment, as shown on Figures 1 and 2 respectively. Notable insight gained during Phase 1 that led to the final equipment designs is summarized below:

- Pre-wetting carbon: laboratory studies conducted with the AC indicate that the "pre-wetting" the AC by allowing it to soak for approximately 24 hours greatly reduces the time required for the material to settle out of suspension.
- Carbon size distribution: Initial testing with the pipe network and discharge nozzles that will deliver the AC to the sediments indicated that variations in the particle size outside of the manufacturer stated range could clog the distribution lines. Therefore, stringent quality control of the particle size screening at the manufacturer is necessary.
- Bathymetry study: A detailed understanding of the river bottom bathymetry is necessary to ensure accurate positioning of the AC placement equipment. Therefore a hydrographic survey of the pilot study area was conducted by Brennan in July 2006. Although this survey indicated that the study area is relatively flat with limited elevation change, the equipment was designed to accommodate the undulations of the bottom and any debris or obstructions that may be encountered. As such, a universal coupling was installed to allow full control of the orientation of

the roto-tiller and flexible mixing tines and blades were installed on both pieces of equipment to accommodate debris.

- Mechanical mixing devices: The mechanical mixing devices fabricated for each piece of equipment need to be rigid/durable enough to ensure penetration to the desired depth, yet flexible enough to yield to obstructions without impacting the performance of the entire unit. Therefore the equipment has been designed as described below and is easily adjustable to match changing field conditions.
- Air venting: The general design for the AC placement equipment includes an enclosing shroud to limit the transport of resuspended material generated during AC placement. However, these enclosing shrouds have the potential to trap air as the equipment is lowered into the water. Therefore, the shrouds have been designed with air relief vents that can be covered with interchangeable filters depending on the performance in the field.
- Equipment weight and ground pressure: The placement equipment will be primarily steel construction weighing in excess of 1 ton. Therefore, the surface area in contact with the sediments will need to be sufficient to support the equipment weight without sinking into the Grasse River sediments.

Initial testing of the performance of various application and mixing equipment was performed as part of the first phase of the project in a controlled test tank at the J.F. Brennan facility in La Crosse, WI, and culminated in a land-based demonstration of candidate techniques with EPA on August 15, 2006. The sediments used in the test tank were of a similar grain size to the Grasse River sediments anticipated within the pilot study area, and were characterized by a relatively uniform level of natural organic carbon. Following application of AC with each piece of equipment in the test tanks, sediment core samples were collected, sectioned into 1.5-inch intervals, and submitted for total organic carbon (TOC) analysis to evaluate the effectiveness of the equipment to achieve the desired dose of AC (2.5 percent by weight in the top 3 to 6 inches).

Tables 1 and 2 present the results of TOC analysis of samples collected from within the upland test tanks following equipment testing on August 2-3 and on August 15, respectively. The data from these two tests are presented graphically on Figures 3 and 4, respectively. These figures also include an estimate of the expected TOC, which was calculated based on the measured TOC and density of the test tank sediments prior to AC application. In addition, the relative percentage of elemental carbon measured in the AC, approximately 85 percent (by weight) as shown on Figure 5, was also considered in the calculation of the expected TOC. It should be noted that the data presented for the August 15 testing has been normalized to the density of the test tank sediments. However, that data for the August 2-3 testing has not been density-normalized since the density of the test tank sediments was not measured for this test. It should also be noted that the expected TOC in the August 15 testing is higher than that from the August 2-3 testing due to the increased dose of AC carbon applied during the second round of testing. Additional sampling is being conducted to determine post-application TOC levels in the treated sediments and further evaluate the performance of the equipment during the

August 15 testing. The results of this additional testing will be provided to EPA in a forthcoming memorandum, anticipated on or about September 15, 2006.

As described above, the equipment development was an iterative approach, whereby the TOC results and observations by the technical team of the initial upland testing were used to improve the equipment designs after each round of upland testing. Additional minor modifications may be made to the equipment following evaluation of the latest round of analytical testing from the upland test tanks and based on performance of the equipment in the initial testing area of the Grasse River.

Planned Phase 2 Activities

Although the roto-tiller apparatus appeared to provide more consistent application and mixing of AC in the test tanks during the Phase 1 land-based testing, it was determined that both pieces of equipment warranted testing in the river during the Phase 2 field activities. Final equipment selection for use within the lower Grasse River pilot study mixed and unmixed treatment areas as part of Phase 2 will be based on subsequent in-river testing conducted within the pilot study "initial testing area" in the lower Grasse River, as described in the Work Plan (Alcoa 2006).

The process of applying AC to the Grasse River sediments will include the following general steps, as depicted on the process flow diagram on Figure 6. Note that the numbered list below corresponds to the numbered steps on Figure 6.

1. **Pre-soak AC:** A measured quantity of AC, pre-screened at the manufacturing facility to remove larger particles, will be added to buckets or tanks filled with water and allowed to soak for a minimum of 24 hours. This procedure allows entrained air to escape and greatly reduces the time required for suspended AC to settle out of the water column during placement.

2. **Add pre-soaked AC to mix tank**: The pre-soaked AC will then be placed in a mix tank equipped with an air-driven paddle mixer to create a slurry of AC and water.

3. **Pump AC slurry to placement equipment:** The AC/water slurry will be pumped through a flexible hose to one of the two pieces of AC placement equipment. For the Phase 1 upland testing, the AC slurry was pumped at a pressure of approximately 15 to 20 pounds per square inch (psi) and a flow rate of approximately 10 gallons per minute (gpm). However, the pump pressure and flow rate will likely be increased for Phase 2 to accommodate conditions at the project site.

4. **Distribute AC slurry to discharge ports/nozzles:** Both the roto-tiller and tine sled are equipped with an AC distribution system consisting of a network of pipes, tubes, flow divisions, valves, and nozzles that distributes the flow pumped from the AC mix tank into numerous discharge points within each piece of equipment. The distribution

system of both pieces of equipment has been specifically tuned, based on the initial land-based testing, to achieve the desired AC application rate. The AC distribution system for the roto-tiller equipment includes approximately 25 individual spray nozzles positioned above the rotating tiller, whereas the distribution system for the tine sled equipment includes an injection port on each of 43 tines. The next section provides additional details on the design of the two pieces of equipment.

5. **Placement equipment:** The AC will be mixed with the Grasse River sediment using both the roto-tiller and tine sled in the initial testing area, both of which are described in further detail below and shown on Figures 1 and 2, respectively. The equipment demonstrating the best performance in the initial testing area will be used in the mixed and unmixed treatment areas described in the Work Plan.
    a. Roto-Tiller: The roto-tiller consists of five parallel rotating shafts, each with numerous ¾-inch thick wire rope "blades" extending out approximately 12 inches from the shaft. The roto-tiller is covered by a rigid enclosing shroud (inside dimension of 7 feet by 12 feet; footprint area of 84 square feet) to minimize resuspended sediment and AC from being transported away from the placement area during mixing. The wire rope "blades" extend below the bottom of the enclosure such that they penetrate approximately 4 to 6 inches into the bottom sediments. The wire ropes are rigid enough to penetrate into the bottom sediments, but flexible enough to pass over obstructions on the river bottom. The AC distribution system, consisting of 25 individual spray nozzles (see item 4), is designed to deliver the AC slurry within the enclosure just above the roto-tiller blades. This equipment can also be used to place the AC on the sediment surface without mixing by disengaging or removing the roto-tiller assembly. The enclosed roto-tiller will be attached to the arm of a backhoe positioned on a barge. At the attachment, the roto-tiller is equipped with a universal coupling that allows the operator to control the position of the roto-tiller on three planes of rotation. The roto-tiller equipment will be outfitted with a GPS system and array of sensors to measure the position and orientation of the equipment when it is under water, as described below. The roto-tiller will be equipped with an internal turbidity meter that will be used for real-time assessment of the settling of material suspended during carbon application and/or mixing using. Once sufficient settling of the mixed sediment and activated carbon has occurred, the equipment will be repositioned to the next application footprint. Based on initial observations of the settling characteristics of the Grasse River sediment and AC, it is anticipated that the vast majority of the suspended material will settle within approximately 3 minutes.

    b. Tine Sled: The tine sled consists of two rows of tine injectors and two rows of tine mixers attached to a steel frame ("sled") that will be towed along the river bottom. The internal dimensions of the sled are 7 feet wide by 10 feet long. The two rows of tine injectors (43 in total) are set near the front of the sled and are angled back at approximately 30 degrees from vertical. One of these two rows of tines is designed to extend approximately 4 inches below the base of the sled; the second row is designed to extend only 2 inches below the base of the sled. Both rows of injection tines are equipped with AC injection nozzles mounted on the trailing edge of each tine. Each of these injection tines is able to rotate to nearly horizontal opposite the direction of travel and independent of the other tines, so that the tines can pass over debris encountered within their path without affecting the performance of the other tines. After passing over the obstacle, the tines will rotate back to their original orientation. Two additional rows of spring-loaded vertical mixing tines (without injection nozzles) are positioned behind the injection tines and will provide additional mixing of the activated carbon with the existing sediments. The tine sled could potentially be modified to place AC on the surface of the Grasse River sediments in the unmixed treatment area by removing and replacing both sets of tines with a set of spray nozzles positioned above the sediment surface. Two interchangeable enclosing shrouds have been fabricated to enclose the tine sled and to help prevent transport of resuspended sediment. One is a rigid (steel) enclosure and the second is constructed of a flexible (geotextile fabric). The performance of these two enclosures, as well as application/mixing without an enclosure will be further evaluated in the pilot study "initial testing area" during field implementation. Similar to the positioning system described above for the roto-tiller, an RTK GPS system will be located on the barge for accurate positioning. However, it will not be possible to use the inclinometer and rotational sensor system described above with the tine sled, since the sled will not be connected to a fixed backhoe arm, but instead towed with a system of cables and winches attached to a fixed barge. Therefore positioning of the tine sled unit will be tracked by monitoring the cable tow speed and angle and visual markers attached to the sled.

6. **Operation of the placement equipment:** The operation of the roto-tiller and tine sled is discussed below, and shown on Figure 6.
    a. Roto-Tiller: The roto-tiller will be attached to the arm of an excavator, lowered to the river bottom, and positioned within the treatment area using a real-time kinematic (RTK) differential global positioning system (DGPS). An RTK GPS receiver will be fixed to both the barge and backhoe. In addition, inclinometers will be attached to various sections of the backhoe and enclosing shroud to track the position of the roto-tiller in reference to the backhoe and barge. Furthermore, a rotational sensor will be mounted near the universal coupling and will measure the degree of rotation when the roto-tiller unit is rotated in the horizontal plane. All of the sensors and the GPS data will be linked to a computer containing Hypack software, which will provide real-time graphical displays of the river bottom bathymetry, the position of the roto-tiller, and the study area to guide the work. Hypack will also be used to continually record the position of the equipment and designate areas already completed. A set of air vents at the top

of the shroud will allow air to escape during the equipment's descent to the river bottom. It is anticipated that this unit will remain stationary throughout the AC application and mixing cycle for each footprint on the river bottom. Once in position, the slurry of AC and water will be pumped from the mix tank and through the distribution system to the 25 spray nozzles above the roto-tiller within the shroud. The AC will be discharged for approximately 1.5 minutes in order to achieve the desired quantity of AC within the footprint of the shroud for the slurry flow rate of 10 gpm used in the Phase 1 land-based testing (flow rates and pump times may vary during Phase 2 field application). Concurrently, the roto-tiller will mix the AC with underlying sediment at a rotational speed of approximately 15 to 20 revolutions per minute (rpm). Once the desired quantity of AC has been applied and the mixing is complete, the roto-tiller will be stopped and the suspended solids will be allowed to settle for approximately 3 minutes before raising and repositioning the unit to an adjacent footprint. Given the accuracy of the positioning system, adjacent treatment footprints will be overlapped by approximately 6 inches. As discussed in step 5 above, an internal turbidity meter will be used to evaluate the settling of suspended materials prior to repositioning the equipment. The cycle of carbon application and mixing will then be repeated. It is not anticipated that the roto-tiller will be lifted above the water surface between cycles.

b. Tine Sled: The tine sled will be attached to a cable and winch system that will allow the sled to be towed along the river bottom at a constant speed. It is currently anticipated that the sled will be positioned on the river bottom approximately 100 to 150 feet from a fixed barge (depending on the treatment area) and then pulled toward the barge. Once the sled has reached the barge, a second vessel will raise the sled to the surface and then reposition it in a track line adjacent and parallel to the previous track. An overlap of approximately 1 foot between adjacent track lines will be used to ensure complete coverage of the study area. The tow speed will be set based on the AC flow rate from the mix tank described above. Based on a pump rate of 10 gpm (as was used in the Phase 1 upland testing), the sled will be towed at approximately 6 to 8 feet per minute. However, actual tow speeds in Phase 2 may vary depending on the pump flow rate. The position of the fixed barge used to tow the tine sled with the cable and winch system will be accurately measured using an RTK GPS system mounted on the barge. The location of the underwater tine sled will be tracked by monitoring the cable length and using visual markers attached directly to the sled that extend above the water surface.

Conclusions

The strategies and equipment operation described in this memorandum are the result of observations and knowledge gained during equipment fabrication and from the Phase 1 upland testing performed in La Crosse, WI. During field deployment in the Grasse River, members of the field team will be continually monitoring the process and equipment, and it is expected that operating parameters will be routinely checked and adjusted as appropriate based on real time-field observations.

References

Alcoa 2006. In-Situ PCB Bioavailability Reduction in Grasse River Sediments; Final Work Plan; Grasse River Study Area Massena, New York. August 2006.

Table 1
Collected on August 15, 2006
Post-Application

Sample ID	Start Depth (in)	End Depth (in)	Total Organic Carbon	Bulk Density (g/cm^3)	Percent Moisture (%)	Density-Weighted TOC (%) 0 - 3"	0 - 6"
August 15, 2006							
Tank #1: Tine Drag							
POSTPH1-1-A	0.0	1.5	1.60	1.10	23.40	1.25	0.96
	1.5	3.0	1.00	1.50	16.20	---	---
	3.0	4.5	0.67	1.70	19.00	---	---
	4.5	6.0	0.78	1.50	19.80	---	---
	6.0	9.0	0.79	1.20	25.00	---	---
	9.0	9.5	0.75	1.50	21.30	---	---
POSTPH1-1-B	0.0	1.5	2.80	1.10	31.90	1.99	1.28
	1.5	3.0	1.30	1.30	21.10	---	---
	3.0	4.5	0.45	1.50	15.30	---	---
	4.5	6.0	0.95	1.40	17.40	---	---
	6.0	9.0	0.77	1.50	15.75	---	---
POSTPH1-1-C	0.0	1.5	1.10	1.20	21.30	1.48	0.97
	1.5	3.0	1.80	1.40	23.40	---	---
	3.0	4.5	0.65	1.50	13.70	---	---
	4.5	6.0	0.45	1.60	16.80	---	---
	6.0	9.0	0.72	1.50	20.00	---	---
	9.0	12.0	0.14	1.40	16.30	---	---
POSTPH1-1-D	0.0	1.5	5.40	1.10	22.90	2.85	1.80
	1.5	3.0	1.20	1.70	14.20	---	---
	3.0	4.5	0.79	1.70	15.70	---	---
	4.5	6.0	1.00	1.50	20.40	---	---
	6.0	8.0	0.61 (0.71)	1.50 (1.60)	18.80 (16.10	---	---
POSTPH1-1-E	0.0	1.5	11.00	0.49	67.70	7.09	2.37
	1.5	3.0	4.10	0.64	54.80	---	---
	3.0	4.5	0.70	1.50	25.00	---	---
	4.5	6.0	0.47	1.50	17.50	---	---
	6.0	9.0	0.53	1.50	15.40	---	---
	9.0	10.0	0.27	1.60	13.80	---	---
POSTPH1-1-F	0.0	1.5	1.20	0.95	29.20	1.08	0.88
	1.5	3.0	1.00	1.30	24.80	---	---
	3.0	4.5	0.53	1.40	21.60	---	---
	4.5	6.0	0.91	1.40	20.40	---	---
	6.0	7.5	1.30	1.50	22.40	---	---
POSTPH1-1-G	0.0	1.5	5.30	0.55	62.70	2.86	1.63
	1.5	3.0	1.90	1.40	21.10	---	---
	3.0	4.5	1.00	1.60	15.10	---	---
	4.5	6.0	0.65	1.40	18.00	---	---
	6.0	9.0	1.10	1.30	15.50	---	---

(continued)

Sample ID	Start Depth (in)	End Depth (in)	Total Organic Carbon	Bulk Density (g/cm^3)	Percent Moisture (%)	Density-Weighted TOC (%) 0 - 3"	0 - 6"
POSTPH1-1-H	0.0	1.5	5.10	0.51	63.40	3.54	3.19
	1.5	3.0	2.60	0.85	44.65	---	---
	3.0	4.5	0.50	0.79	26.40	---	---
	4.5	6.0	4.30	1.50	17.70	---	---
	6.0	9.0	0.63 (0.70)	1.40 (1.70)	15.20 (14.20	---	---
	9.0	11.0	0.50	1.50	14.30	---	---
Tank #2: Tiller (Inject/Mix)							
POSTPH1-2-I	0.0	1.5	2.50	0.94	33.20	1.56	0.91
	1.5	3.0	0.88	1.30	22.20	---	---
	3.0	4.5	0.54	1.20	24.00	---	---
	4.5	6.0	0.28	1.60	17.30	---	---
	6.0	9.0	0.25	1.50	15.25	---	---
POSTPH1-2-J	0.0	1.5	16.00	0.75	38.60	8.15	4.60
	1.5	3.0	3.10 (3.40)	1.20 (1.20)	28.00 (29.00	---	---
	3.0	4.5	2.10	0.96	26.30	---	---
	4.5	6.0	0.84	1.20	21.60	---	---
	6.0	9.0	1.30	1.30	23.70	---	---
	9.0	12.0	0.89	1.50	17.40	---	---
POSTPH1-2-K	0.0	1.5	5.10	0.63	56.70	3.64	2.42
	1.5	3.0	2.50	0.81	36.70	---	---
	3.0	4.5	1.80	0.54	32.35	---	---
	4.5	6.0	0.98	0.99	26.20	---	---
	6.0	9.0	1.10	1.40	22.70	---	---
	9.0	12.0	0.03	1.40	13.90	---	---
POSTPH1-2-L	0.0	1.5	9.70	0.52	67.10	11.53	4.53
	1.5	3.0	13.00	0.65	44.20	---	---
	3.0	4.5	1.40 (1.80)	1.30 (1.30)	19.50 (17.50	---	---
	4.5	6.0	1.40	1.40	23.70	---	---
	6.0	9.0	1.40	1.20	24.40	---	---
	9.0	12.0	0.09	1.50	13.40	---	---
POSTPH1-2-M	0.0	1.5	4.90	0.80	40.40	3.60	2.92
	1.5	3.0	2.10 (2.40)	0.75 (0.79)	43.00 (47.20	---	---
	3.0	4.5	1.50	0.53	30.50	---	---
	4.5	6.0	2.70	1.40	22.50	---	---
	6.0	9.0	1.00	1.10	24.60	---	---
	9.0	12.0	0.42	1.50	15.80	---	---

Tank #3: Tiller (Inject Only)							
POSTPH1-3-N	0.0	1.5	1.70	0.78	32.00	1.45	---
	1.5	3.0	1.30	1.30	25.40	---	---
POSTPH1-3-O	0.0	1.5	2.70	1.10	33.60	2.16	---
	1.5	3.0	1.70	1.30	24.60	---	---
POSTPH1-3-P	0.0	1.5	26.00	0.51	44.00	9.65	---
	1.5	3.0	2.70	1.20	27.00	---	---
POSTPH1-3-Q	0.0	1.5	11.00	0.77	37.70	4.66	---
	1.5	3.0	0.23	1.10	27.90	---	---
POSTPH1-3-R	0.0	1.5	2.60	0.69	29.20	1.90	---
	1.5	3.0	1.50	1.20	25.20	---	---

Note:

1. Duplicate values are shown in parenthesis.

Table 2
Total Organic Carbon Results from ACPS Phase 1 Testing
Collected on August 2-3, 2006
Post-Application

Sample ID	Start Depth (in)	End Depth (in)	Total Organic Carbon (%)
August 2-3, 2006			
Tank #1: Tine Drag			
ACPSPH1-1-1	0.0	1.5	1.90
	1.5	3.0	0.56
	3.0	4.5	0.77
	4.5	6.0	0.90
	6.0	8.0	0.58
ACPSPH1-1-2	0.0	1.5	1.00
	1.5	3.0	1.00
	3.0	4.5	0.73
	4.5	6.0	0.70
	6.0	9.0	0.45
	9.0	12.0	0.79
ACPSPH1-1-3	0.0	1.5	1.20
	1.5	3.0	0.80 (0.90)
	3.0	4.5	0.79
	4.5	6.0	0.52
	6.0	9.0	0.74
	9.0	12.0	0.63
ACPSPH1-1-4	0.0	1.5	2.00
	1.5	3.0	1.30
	3.0	4.5	0.58
	4.5	6.0	0.79
	6.0	9.0	0.63
	9.0	12.0	0.76
ACPSPH1-1-5	0.0	1.5	1.40
	1.5	3.0	0.77
	3.0	4.5	0.84
	4.5	6.0	0.44
	6.0	9.0	0.27
	9.0	12.0	0.64
Tank #2: Tiller (Inject/Mix)			
ACPSPH1-2-6	0.0	1.5	2.10
	1.5	3.0	1.00
	3.0	4.5	1.30
	4.5	6.0	1.10 (1.10)
	6.0	9.0	1.20
	9.0	12.0	1.10

(continued)

Table 2
Total Organic Carbon Results from ACPS Phase 1 Testing
Collected on August 2-3, 2006
Post-Application

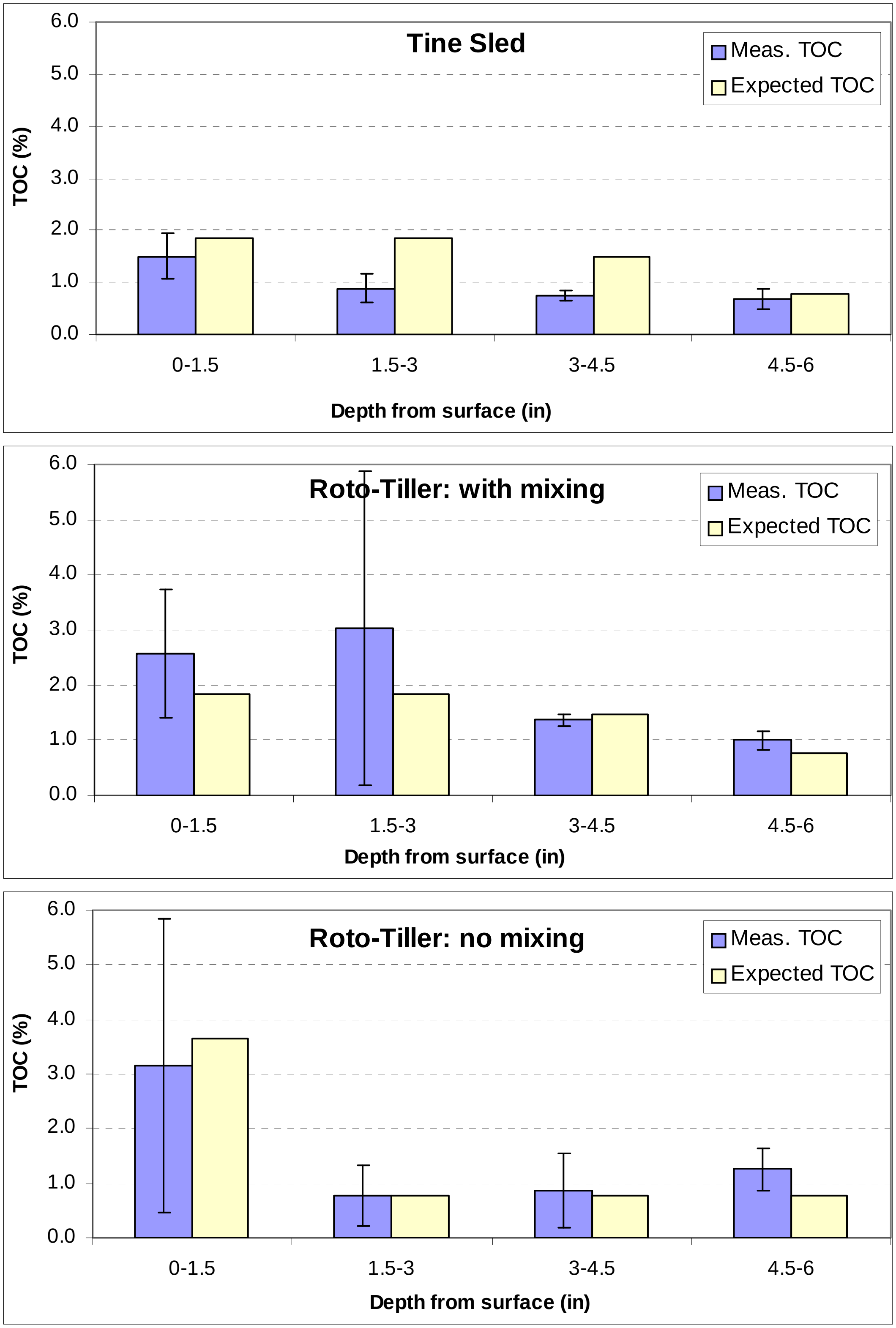
Sample ID	Start Depth (in)	End Depth (in)	Total Organic Carbon (%)
ACPSPH1-2-7	0.0	1.5	3.90
	1.5	3.0	6.30
	3.0	4.5	1.50
	4.5	6.0	1.10
	6.0	9.0	0.72
	9.0	12.0	0.13
ACPSPH1-2-8	0.0	1.5	1.70
	1.5	3.0	1.80
	3.0	4.5	1.30
	4.5	6.0	0.80
	6.0	9.0	0.56
	9.0	12.0	0.25
Tank #3: Tiller (Inject Only)			
ACPSPH1-3-9	0.0	1.5	0.08 (2.80)
	1.5	3.0	1.10
	3.0	4.5	1.30
	4.5	6.0	1.10
	6.0	9.0	0.75
	9.0	12.0	0.11
ACPSPH1-3-10	0.0	1.5	5.00
	1.5	3.0	1.10
	3.0	4.5	1.20
	4.5	6.0	1.70
	6.0	9.0	0.29
	9.0	12.0	0.21
ACPSPH1-3-11	0.0	1.5	4.40 (4.00)
	1.5	3.0	0.12
	3.0	4.5	0.08
	4.5	6.0	0.97
	6.0	9.0	0.99
	9.0	12.0	0.37

Note:

1. Duplicate values are shown in parenthesis.

Figure 1
Roto-Tiller Device

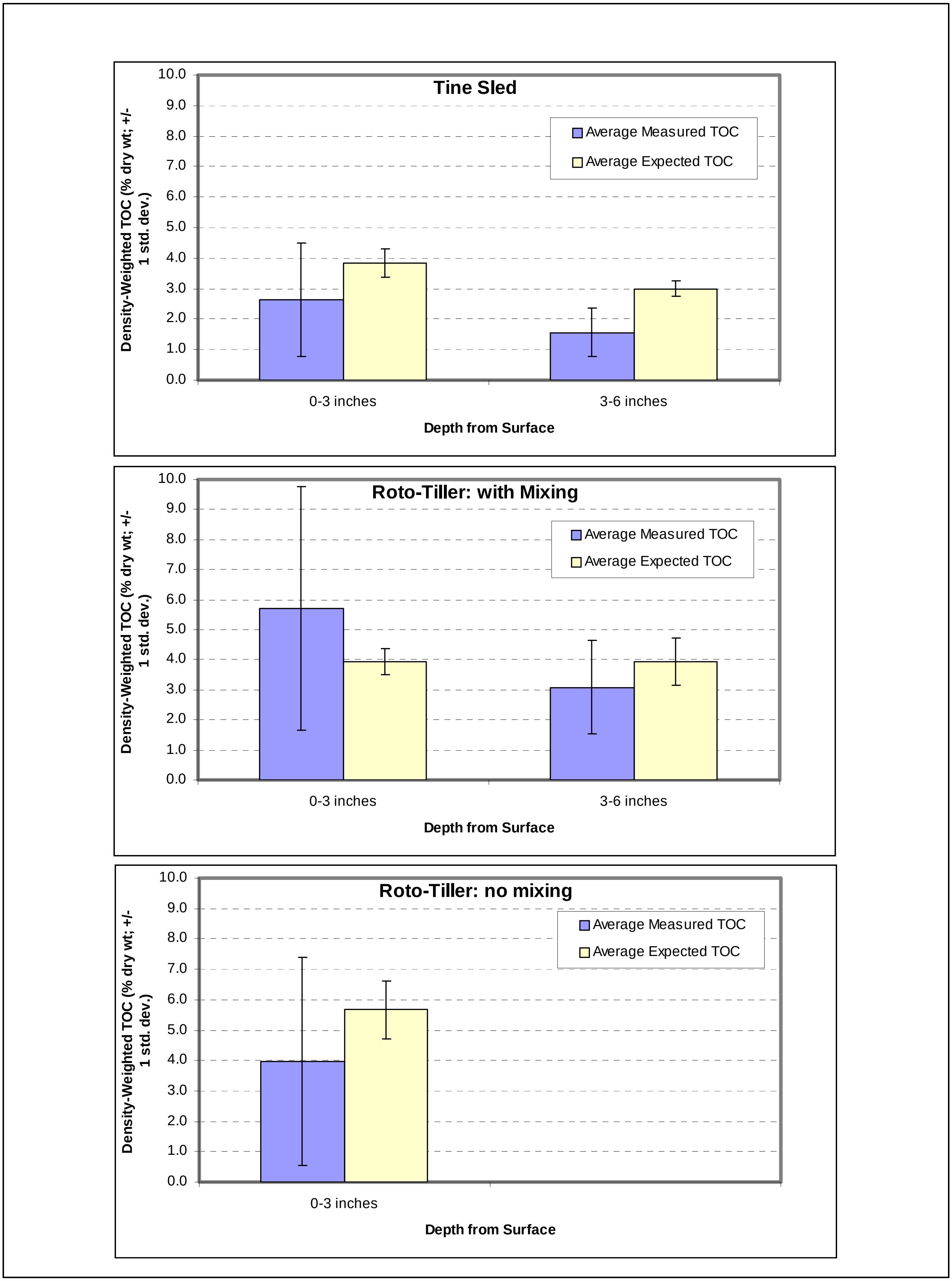
Figure 2
TOC Results from August 2-3, 2006 Upland Testing



ALCOA

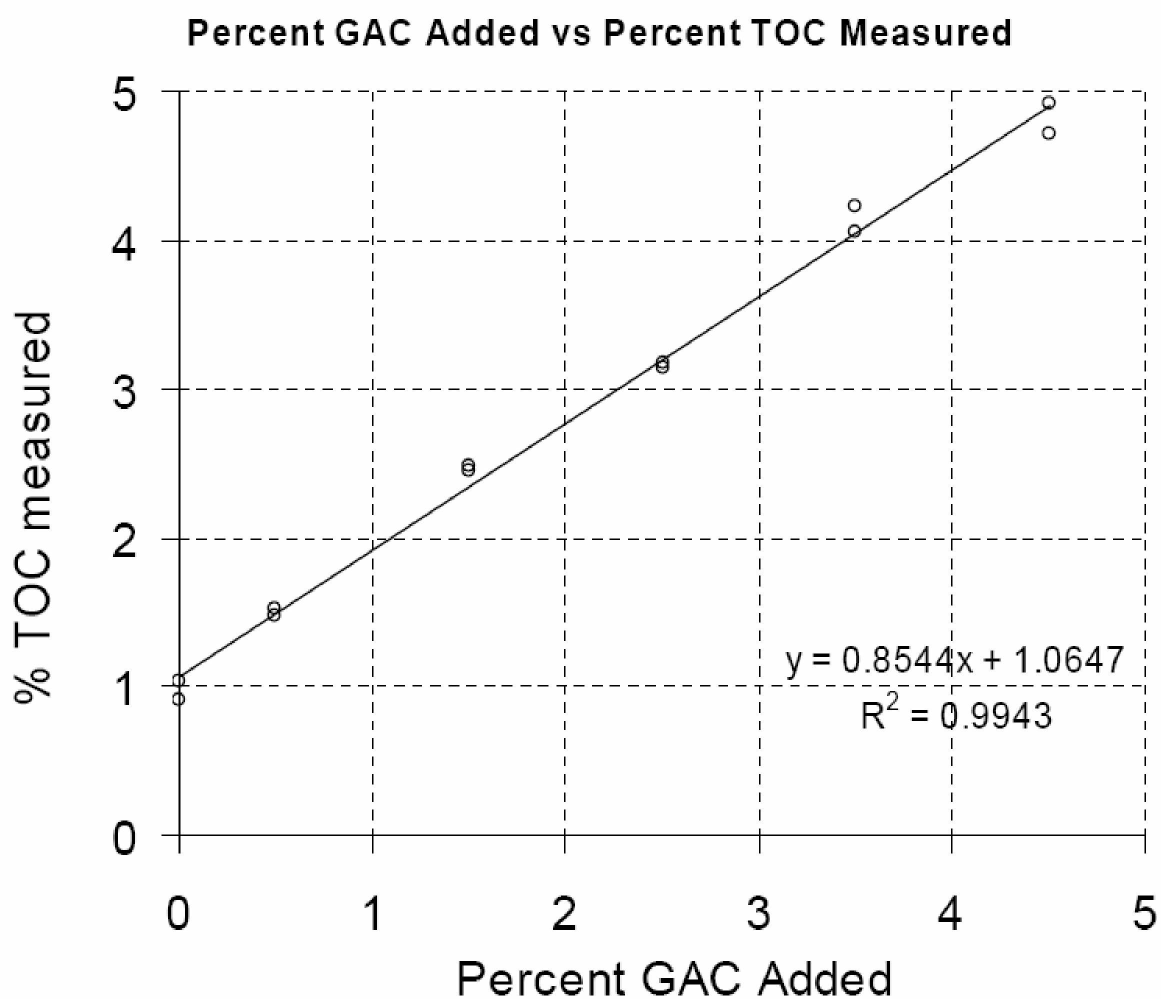
Figure 3

TOC Results from August 2-3, 2006 Upland Testing



ALCOA

Figure 4
TOC Results from August 15, 2006 Upland Testing



ALCOA

Figure 5
TOC relationship for Calgon Carbsorb (50 x 200) Activated Carbon

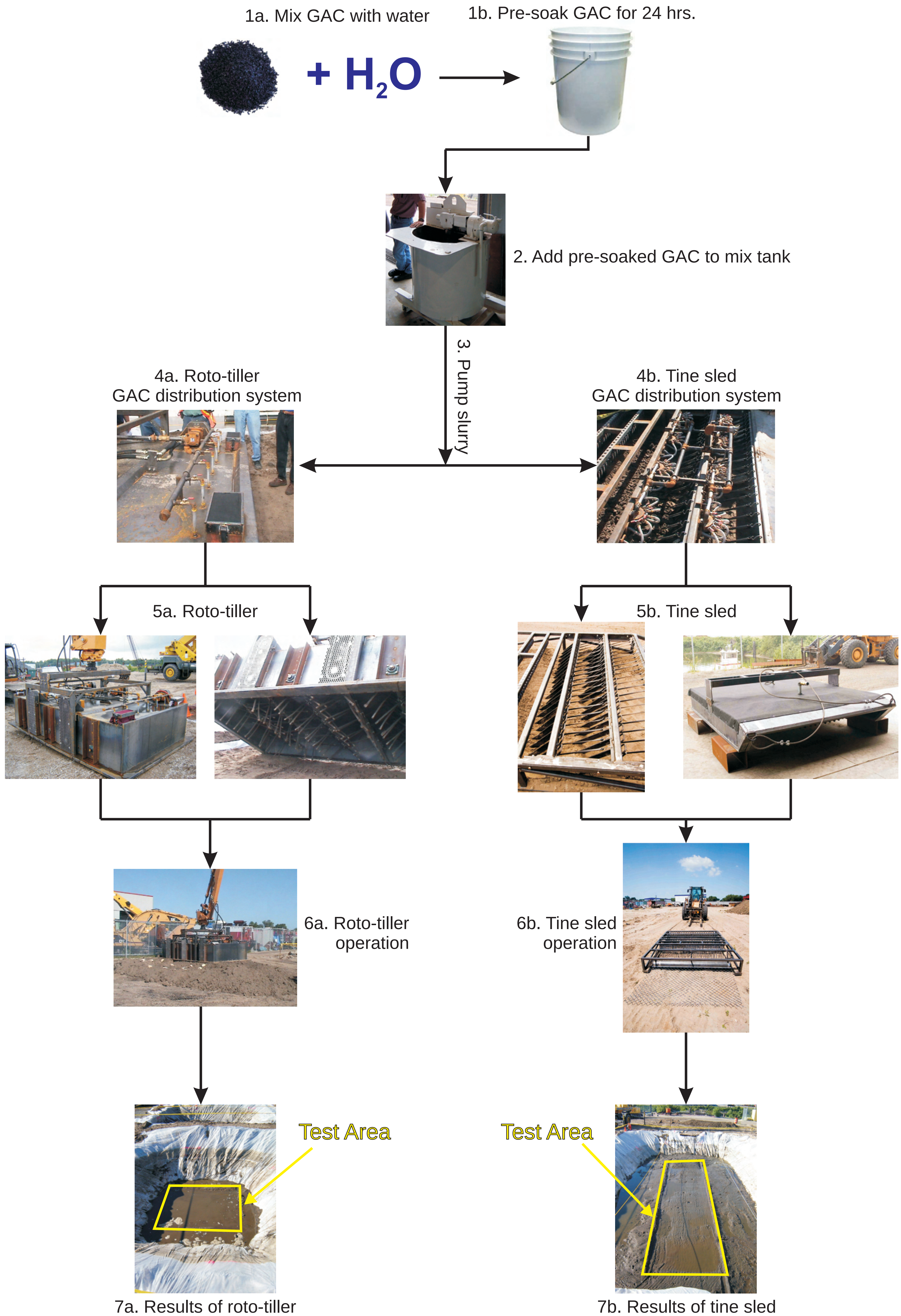


Figure 6 - GAC Placement Process Flow Diagram
Grasse River Activated Carbon Pilot Study

GRASSE RIVER ACTIVATED CARBON PILOT STUDY

Summary of Phase 1 Supplemental Sampling of Upland Test Tanks and Phase 2 Sampling Plan

This memorandum presents the results of sediment sampling and analysis conducted as part of the Phase 1 upland test tank demonstration of the Activated Carbon Pilot Study (ACPS) placement equipment. This memorandum is intended to supplement the memorandum provided on August 30, 2006 titled *"Summary of Activated Carbon Placement Equipment Development and Operation"* (Alcoa, August 2006).

Summary of Phase 1 Supplemental Sampling

As discussed in the August 30 memorandum, a land-based demonstration of the application and mixing equipment was performed as part of the first phase of the project in controlled test tanks at the J.F. Brennan facility in La Crosse, WI on August 15, 2006. Following application of activated carbon (AC) on August 15, 18 sediment core samples (3-inch diameter) were collected, and segmented as follows: 0-1.5 inches; 1.5-3 inches; 3-4.5 inches, 4.5-6 inches; 6-9 inches; and 9-12 inches (note only the top 3 inches were sampled from the roto-tiller unmixed tank). These samples were submitted for total organic carbon (TOC), percent moisture, and bulk density analyses to evaluate the effectiveness of the equipment to achieve the desired dose of AC (2.5 percent by weight in the top 6 inches). Cores (n=18) were also collected prior to carbon application on August 14, 2006. Following a review of the data collected on August 15, additional larger volume samples (12-inch square surface area) were collected on August 28 and 29, 2006 to evaluate the spatial variability inherent in the application. Samples were collected from the top 12 inches and segmented as follows: 0-3 inches; 3-6 inches; 6-9 inches; and 9-12 inches (note only the top 3 inches were sampled in the roto-tiller unmixed tank) at 18 locations, and submitted for TOC, percent moisture, and bulk density analyses.

The results of the August 15 and August 28/29 sampling are presented on Figure 1 for the tine sled, roto-tiller, and roto-tiller unmixed applications. The data presented on Figure 1 have been normalized to the density of the test tank sediments. This figure also includes an estimate of the expected TOC, which was calculated based on the amount of AC applied and the measured TOC and density of the test tank sediments prior to AC application. In addition, the relative percentage of elemental carbon measured in the AC, approximately 85 percent (by weight) as summarized in the August 30 memorandum, was also considered in the calculation of the expected TOC.

The results of the August 28/29 sampling corroborate the results and conclusions from the August 15 sampling in that the roto-tiller apparatus appears to provide the greatest chance of success during the in-river field application. Although the results from the tine sled test tank indicate that this equipment was not completely successful in achieving the target TOC concentration in the Phase 1 testing, minor modifications will be made to the equipment prior to application in the initial testing area to increase the chance for success in the field. The equipment modifications will include an attachment to the end of the trailing set of mixing tines (as described in the August 30 memorandum) with the intent of increasing the degree of mixing of the AC with the in-situ sediment. The performance of both pieces of equipment will be evaluated in the Grasse River during work in the "initial testing area," as described below.

Phase 2 TOC Sampling Plan

Core samples will be collected during implementation of the ACPS to verify application of the target dose of carbon within the placement areas. Samples will be collected from the initial testing area, mixed treatment area, and unmixed treatment area as shown on Figure 2.

The purpose of the sediment core analysis for TOC is to evaluate the spatial distribution of the applied carbon in sediments during placement. As seen in the land-based trials, it is expected that the spatial distribution of carbon in sediments immediately after application may be non-uniform at a sampling scale of a few inches. Over time, the applied carbon may become more evenly distributed in the sediments through natural mixing processes. The distribution of carbon may have an impact on the PCB biouptake in benthic organisms. Therefore, it will be important to perform TOC measurements at a sampling scale that captures any spatial heterogeneity of carbon application and any changes in heterogeneity over the study period. Therefore, 3-inch sediment core samples will be collected for TOC analysis instead of larger diameter cores that may not be able to measure the heterogeneity at the scale of a few inches.

To account for the expected variability in applied carbon dose exhibited during the land-based trials, USEPA's Guidance on Systematic Planning Using the Data Quality Objectives Process (USEPA, February 2006) was used to determine sample size. As such, the following will be collected from each area:

- Initial Testing Area:
    - Roto-tiller Mixed: 16 samples
    - Roto-tiller Unmixed: 6 samples
    - Tine Sled: 16 samples
- Mixed Treatment Area: 16 samples (subject to modification during implementation based on initial testing area results)
- Unmixed Treatment Area: 16 samples

Sediment will be collected manually using 3-inch-diameter Lexan core tubes. Cores will be advanced such that a minimum of 6 inches of material are recovered at each location. For the tine sled and roto-tiller (mixed) applications, cores will be segmented into 0- to 3-inch and 3- to 6-inch intervals. For the roto-tiller (unmixed) application, cores will be segmented 0 to 3 inches.

All samples will be submitted for TOC, percent moisture, and bulk density analyses. For samples collected during initial testing area implementation, the following turn-around-time (TAT) will apply:

- TOC, percent moisture, and bulk density: 8am EST the following morning (Day X) for samples prepared for courier delivery by 4pm EST (Day X-1)

For samples collected during the mixed and unmixed treatment area implementation, the following TAT will apply:

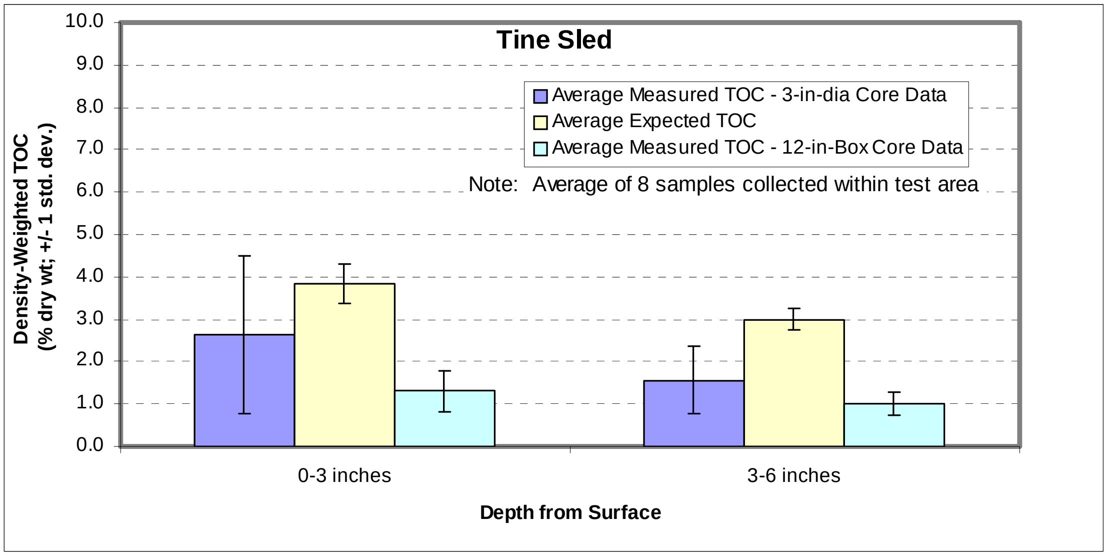
- TOC, percent moisture, and bulk density: 5pm EST the following day (Day X) for samples prepared for courier delivery by 4pm EST (Day X-1)

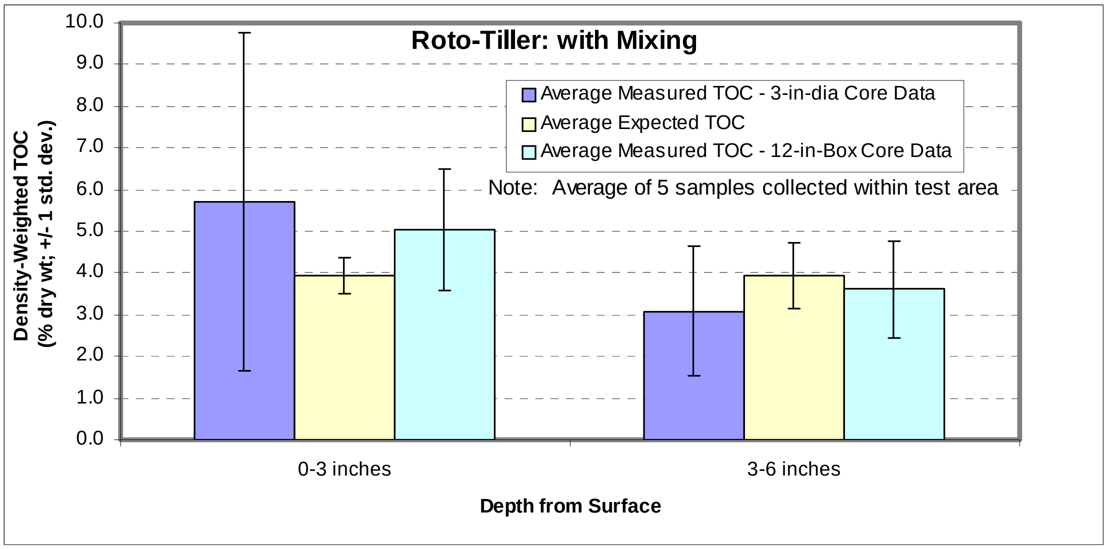
Results will be compiled as received and evaluated against baseline TOC information (collected at the same sampling locations) to assess the performance of each piece of equipment and recommend any necessary field adjustments as the ACPS progresses to the mixed and unmixed treatment areas.

References

Alcoa. August 2006. Technical Memorandum submitted to USEPA: Summary of Activated Carbon Placement Equipment Development and Operation. August 30, 2006.

USEPA. February 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process. EPA QA/G-4. EPA/240/B-06/001.





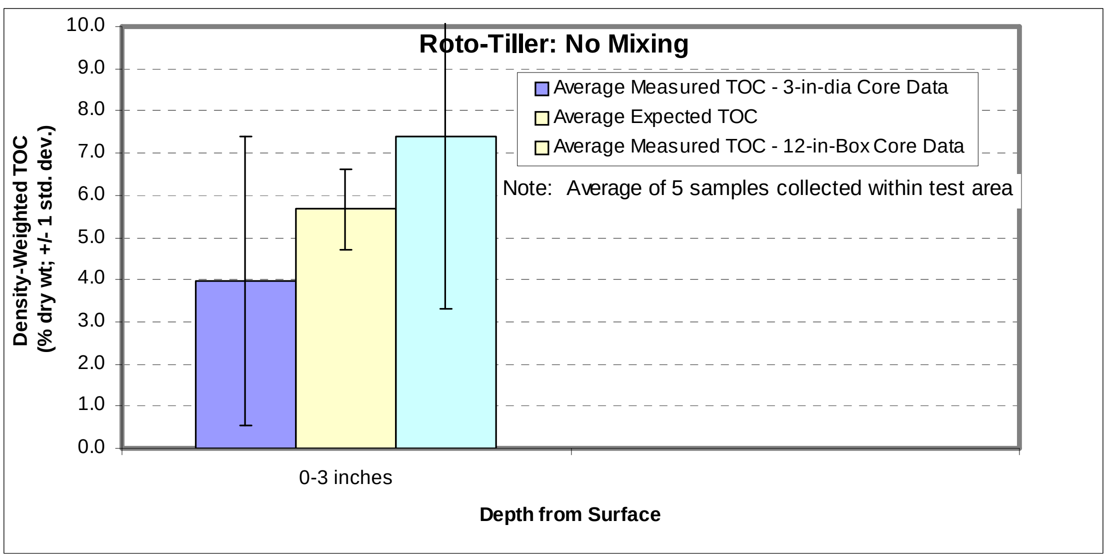
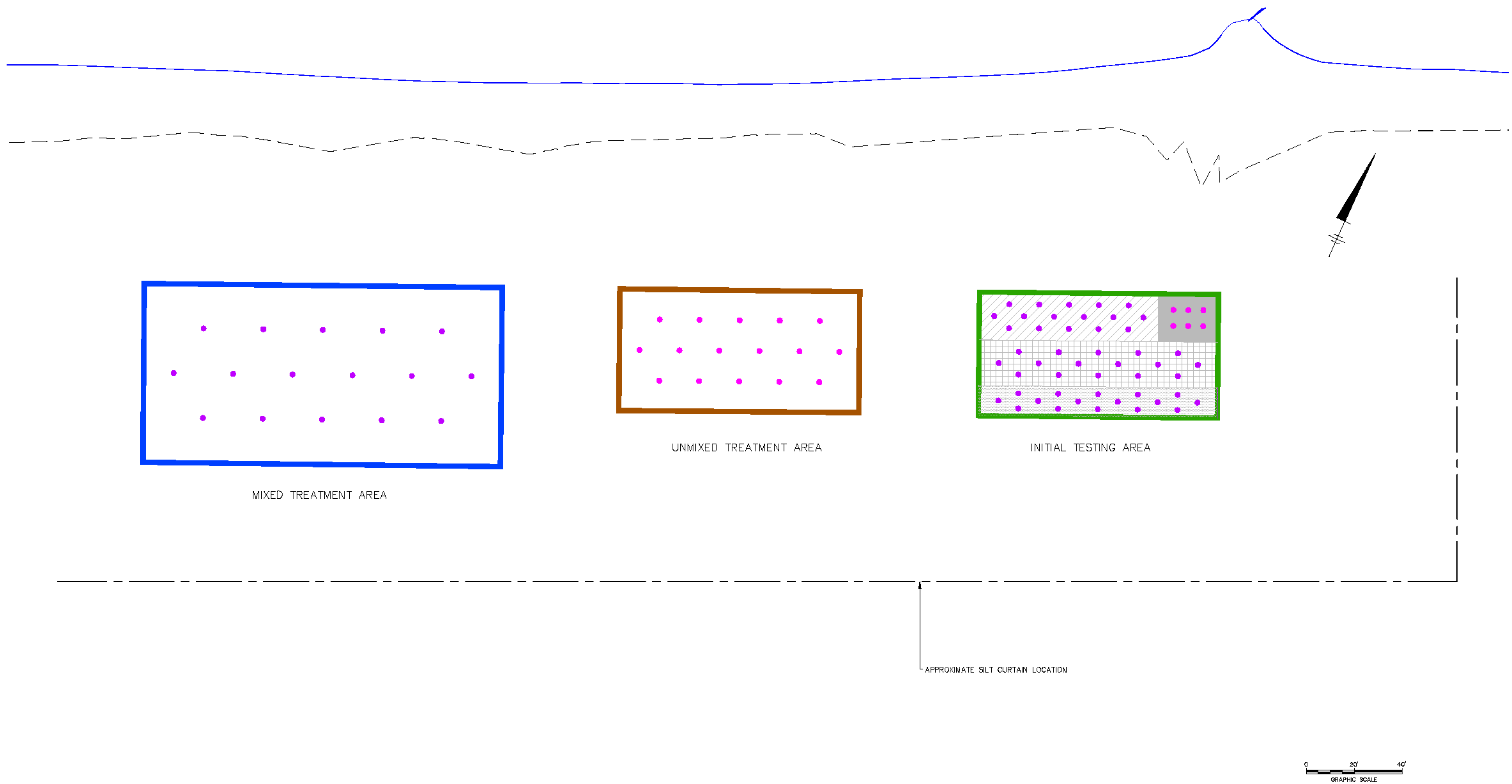


Figure 1

TOC Results from Aug 15 and Aug 30, 2006 Sampling

ALCOA



NOTE:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

LEGEND:

- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- INITIAL TESTING AREA
- MIXED TREATMENT AREA
- UNMIXED TREATMENT AREA
- APPROXIMATE SEDIMENT CORE LOCATION WITH SEGMENTATION INTO 0–3" AND 3–6" SAMPLES
- APPROXIMATE SEDIMENT CORE LOCATION WITH SEGMENTATION INTO 0–3" SAMPLES

LEGEND:

- TILLER MIXED
- TILLER UNMIXED
- TINE SLED
- ACCEPTED METHOD

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
ACTIVATED CARBON PILOT STUDY

SEDIMENT SAMPLING LOCATIONS

ALCOA

FIGURE
2

SYR-85-KMD KLS LJP LAYER: ON=*, OFF=*REF*
F:\ACTIVE\-DWG\ACT\1081D001\10442C06.DWG SAVED:9/11/2006 4:29 PM LAYOUT:Layout1 PAGESETUP:---- PENTABLE:PLTFULL.CTB PRINTED:9/11/2006 4:29 PM BY:LPOSENAUER
PROJECTNAME:----
XREFS: IMAGES:
10442X03 10442X07.TIF
10442X02
10442X00

APPENDIX D

ACPS CONSTRUCTION PHOTOS

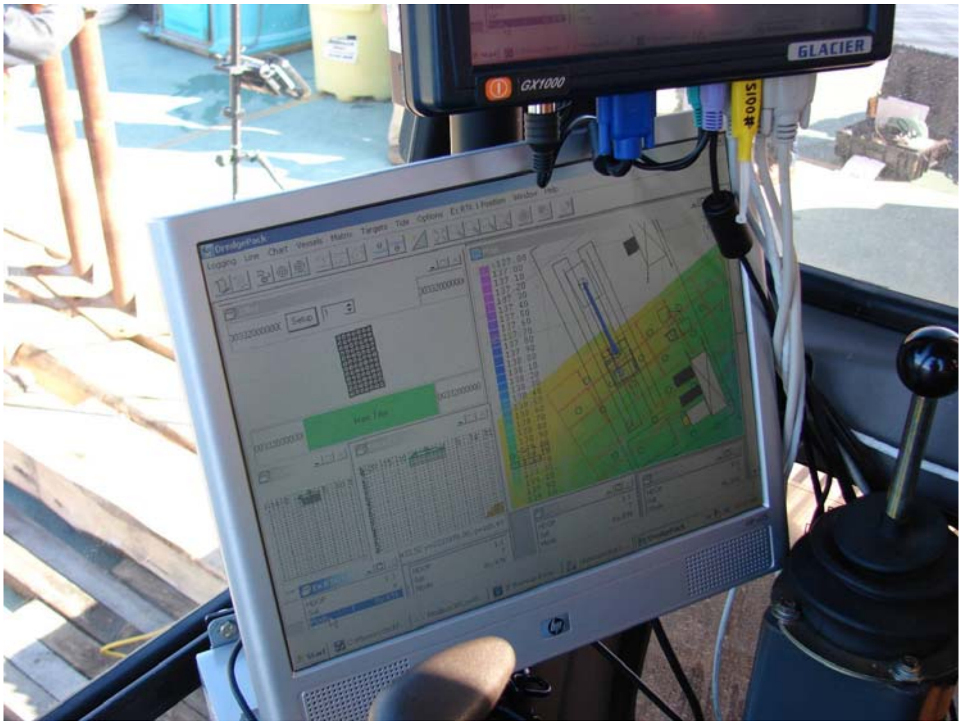
Project Site

Project Site (cont.)

Turbidity Curtain

Tiller Equipment

Tiller Equipment (cont.)



Tiller Position Tracking System

Universal Coupling Attachment

Tiller Equipment (cont.)

Tine Sled Equipment

Tine Sled Equipment (cont.)

Core Sampling

APPENDIX E

WEEKLY PROGRESS MEETING MINUTES

Grasse River Activated Carbon Pilot Study

Weekly Progress Meeting Minutes
(Stakeholder KickOff Meeting)
September 21, 2006

In attendance: Paul LaRosa, Larry McShea, Bruce Cook, Dino Zack, Bill Moon, Ron Kuhn, Dan Casey, Jessica Jock, Ray Mangrum, Ken Manning, Paula Beattie

Attending by phone: Young Chang, Heather VanDewalker, Sarah Hill, Lea Everson, Adrian Clough, Larry Alden, Maheyar Bilimoria

Paul LaRosa began by stating that the objective of the project was to reduce the pcb bio-availability to the organisms in the river by using activated carbon. The project is in what is termed Phase 2 which is the field implementation portion. Site preparation activities began on September 11, 2006 when mobilization began. It is expected that we begin river carbon injection on Monday, September 25, 2006. It is also expected that the river work will continue for 3 to 4 weeks depending on weather and other variables and that the project will then begin demobilization and site restoration in mid-October. More details will be forthcoming for future meetings when more people are onsite.

No questions followed this portion of discussion.

Paul LaRosa then referred to the organization chart; explaining the various agencies, contractors and their various assignments/duties for the project.

It was determined that the academia names will be added; Dino Zack of EarthTech, Larry Alden of the Department of Environmental Conservation and Jessica Jock of the St. Regis Mohawk Tribe; and Paula Beattie as admin support will be included. Phone numbers and the ACPS office fax number will also be added. A revised version of organization chart will be forwarded.

Young Chang noted that she does not expect to be participating in progress meetings but that Dino Zack will be onsite and will attend. Young indicated that having the meeting on any particular day would not change her availability. Young further stated that agency members first point of contact should be Dino Zack.

Paul LaRosa stated that Weekly Progress meeting schedule would remain on Tuesday mornings at 10am in the conference room of ACPS Office, Building 65. Paul went on to ask that anyone who has an agenda topic they would like to see added to do so before the end of business on the Monday before the scheduled Weekly Progress meeting. Young Chang requested that all meeting materials; agendas, meeting minutes, any presentation material be distributed to the list she previously provided.

Heath and Safety

The Alcoa Responsible Person, Bill Moon, spoke to the state of health and safety for the ACPS project to date, indicating that all current project personnel have been site Alcoa trained as well as field trained. All completed safety training must be documented and on file. Bill Moon reported that several site and office inspections have already occurred and that all information has been documented. Greg Rutherford is expected to be onsite the first week of October to perform the formal Alcoa audit. Results will be published.

Anyone who needs to coordinate safety training should call Bill Moon directly at 315-250-6453. In response to a question from Young Chang, Bill Moon noted that the Visitor Training takes approximately a half an hour; and that the TetraTech/Brennan contractor orientation/safety training takes 2 to 4 hours. Bruce Cook noted that there is a separate safety orientation to go on the marine plants. Bill Moon requested that if anyone is bringing guests with them and personal protection equipment is needed to let us know in advance if possible so we have time to arrange the safety metatarsal boots required in sizes requested.

Jessica Jock indicated to Young Chang that she would coordinate her safety training directly with Bill Moon at the conclusion of the meeting.

Mobilization and site prep work completed to date

Ray Mangrum began the discussion stating that mobilization began on September 11th with most of the day committed to safety training and plant orientation of site personnel. The equipment began to arrive on September 12. In total, 26 loads of equipment were received with the preparation of equipment beginning on September 18th including the loading of equipment onto the marine plants. In addition to site preparation, approximately 500 foot of turbidity curtain arrived and the anchoring of this curtain is expected to be completed on September 21st. It is expected that the marine plants will be ready for carbon deployment on September 25th.

There have been ongoing tests performed with the GPS units to ensure they are reading correctly and are ready for September 25th.

Land-side viewing area

Two landowners have agreed to allow access from their property for visitors to be able to view the work being performed from approximately 200 ft across the river. There are some rules with regard to this land-side viewing area and there is a Visitor Pass and Pass Log in place with Paula Beattie in the admin office (315-764-4714) who can be contacted with regard to this matter. The land-side viewing area is also used for nighttime security. It is important that we respect the landowners requests of us with regard to the rules set forth. The second contact on this issue would be Dan Casey who can be reached via cell phone at (315) 391-0445.

Boat Access

Boat access may also be available for use with advance knowledge of arrival. The CDM boat can accommodate 4 people (3 guests plus the operator), Bill Moon (315-250-9431) is the contact for boat scheduling. It is important to note that work may have to shut down to accommodate visitors who are on the river.

QA/QC monitoring

Paul LaRosa indicated that monitoring will occur as real-time as possible. There will be visual verification on qualitative basis against standards that will be available on the vessel. Sediment cores will be collected after carbon is placed for total organic analysis. It is expected that this analysis will have a possible 11 hour turn around with NEA Lab for the critical initial test area. Additional analysis turn around is expected at 24 hours. Monitoring is expected to begin in coordination with the roto-tiller work. There are other, possibly more accurate, methods available; however those tests would take longer that the TOC method.

Heather VanDewalker noted that a water video camera will be used in attempt to see progress during the trials. In response to a question posed by Young Chang, it was stated that the camera is outside the equipment. It is expected that if the camera works as it is hoped, that we a lot of learning can occur right away, as the results will be immediate. Further details will be forthcoming when the work commences and we have some pictures. In response to a question by Young Chang, Paul LaRosa noted that a way to distribute materials will be decided and that the whole distribution list provided by Young will be utilized.

Environmental monitoring

Heather VanDewalker reported that there are two components to environmental monitoring; noise monitoring and water column monitoring. The noise was included in the CHASP Update previously distributed. The noise monitoring is similar to what occurred during ROPS where 3 locations in the vicinity of the pilot study are being monitored for noise. The first is the closest shoreline adjacent to the landside viewing area, the second is near the houseboat; and the a third on the shoreline adjacent to the closest downstream residents. Noise monitoring will occur during application of carbon in the initial test area and will be evaluated real-time against the control levels of 75 dba. Recommendations can then be made as to whether or not monitoring can be done daily or will be reduced to lesser frequency during the second and third weeks. Noise monitoring logs will be available onsite.

The water column component has also been set up similar to the ROPS program. In the Work Plan, Figure 4-1 shows the water column in proximity to pilot study area. Water column monitoring will occur daily, two hours after activity starts (actually, started with the implementation of the turbidity curtain). Water column monitoring will occur at 5 locations.

One at a transect location 500 ft, the second location is 500ft downstream from the curtain, there are two areas outside the curtain, downstream and one within the containment system. Samples will be collected, analyzed for pcbs with a 24 hour turn around time. Water quality parameters include pH, temperature and real time measure of turbidity.

Data management and reporting

Adrian Clough reported that QEA will be generating water column data in a form similar to the ROPS form with the upper portion reporting the data from the previous day events. The lower portion is different than ROPS with it being generated with a series of time series spots which will include flows, and turbidity in the upstream and downstream locations.

Corrective action triggers

Heather VanDewalker noted that if a trigger is reached, a review of equipment and the curtain would occur to be sure the equipment is functional and the curtain is not damaged or dislodged. Necessary repairs or re-alignments would be made. Paul LaRosa indicated that a provision for floating debris is in place; a boom would collect any debris before it got outside the project area. If the source is outside the area, work would cease to determine path forward. Bruce Cook noted that it is not expected that any turbidity excesses will occur with this project.

Larry McShea noted that the project is a pilot study; that Alcoa is brining this technology to the field for the first time for only a short period of time so please recognize that we will need to make changes; but that communications will occur to attempt to make things happen quickly; he asked for everyone's understanding in that regard.

Next Weekly Progress meeting to be held on Tuesday, September 26, 2006 at 10am

Grasse River Activated Carbon Pilot Study

Weekly Progress Meeting
September 26, 2006

In attendance: Ray Mangrum, Jessica Jock, Bill Moon, Bruce Cook, Heather VanDewalker, Dan Casey, Paul LaRosa, Bill Welch, Paula Beattie

Attending by phone: Maheyar Bilimoria, Adrian Clough, Jim Quadrini, Clay Patmont, Dick Luthy,

Health and safety

Bill Moon reported that all site workers have been trained, including new arrivals. Those planning on visiting the site need to coordinate the necessary training so the safety professionals can be most effective. There are no injuries, reportables or accidents to date.

The site contractors continue to conduct health and safety audits on a daily and weekly basis.

A mock-only man overboard with injury drill is currently being coordinated. This drill will not include actual ambulance or hospital participation, only Gate 1 notification and participation by the Alcoa ERTs. It is imperative we have a protocol in place that everyone is aware of and follows in the event of emergency.

From the health and safety perspective, the first day of operation went well; some observations regarding operation/vehicle/worker separation were made and discussed; and an improved protocol for when visitors are around the working equipment needs further discussion.

The attitude and cooperation from the contractor and others has been outstanding and no major issues are expected through the project. Improvements can always be made and have been already made through superior communication by those involved.

No questions followed the discussion on health and safety.

Action items from previous meetings

Due to the short duration between the first and second meetings, the meeting minutes from September 21, 2006 will follow. A slight revision to the project organization chart has occurred, adding people and phone numbers.

No questions followed this portion of the meeting.

Review of site operations

Ray Mangrum stated that Marine Plants 1 and 2 were complete on Friday; the GPS units and corresponding documentation was set up Monday, September 25. The site was ready and mixing with the roto-tiller began about noon. Operation went smoothly; the turbidity readings indicated undetectable increase in turbidity immediately adjacent to the roto-tiller. Some adjustment to positioning occurred; correcting the necessary coordinates which will make all the difference in projection. The GPS unit surpassed expectations and the real-time value is tremendous. A video of the process was made to add to the video that has been previously recorded. The operator sees a plan view and two profile views in addition to bathymetry; in relation to test area. The screen shot is then shot to the display; and the footprint and the vertical lines can be seen. The data management tool for this is AutoCAD.

Work in "Initial Testing Area"

Paul LaRosa followed up by indicating that a video survey was taken during first footprint of the roto-tiller; when the camera was lowered down at slow rate to see first application as operator deployed to mud line watched for turbidity and displacement on the mud line. Turbidity measurements were also taken real time; the turbidity outside the roto-tiller was basically non-detect and stayed that way during lowering, mixing, and raising.

There is a turbidity meter mounted inside of the shroud to monitor the rate of settling of sediment and carbon resuspended during mixing. Everyone involved is quite pleased with the operation of equipment and lack of turbidity generated. Visual observations of carbon in the sediment using the wash method (whereby the sample is washed so the clay particles can be seen) are inconclusive to date. In addition, visual observations are inconclusive using the sieve method whereby the material is sieved to separate out the particle size distribution representative of the carbon. Control standards with various doses of carbon are being used for comparison to the field samples. These standards were created with Grasse River sediments. In addition to field testing BBL is collecting TOC samples with lab results taking less than 12 hours. The path forward for next week will be determined after the results of sample testing have been received and evaluated so informed decisions can be made.

On Wednesday, September 27th, the tine sled will be used in the initial test area; those onsite will see this application. There is no GPS equipment on the sled; but we are capturing xyz positioning which is expected to work well.

In response to a question by Dick Luthy; it was explained that the carbon is being pumped as expected with the roto-tiller. It is not possible to get the video inside the enclosure of the roto-tiller. Ray Mangrum noted that the line is flushed after each application and that the hose is clear for the first ten feet or so the flush is visual.

QA/QC monitoring

Heather VanDewalker reported that noise monitoring indicated that the outboard motor on the Marine Plant was the loudest equipment and that the noise levels were still well within acceptable range. Ray Mangrum noted that improvement was made to the mixing speed of the carbon mix tank to cut the noise back.

1-week look ahead

Paul LaRosa noted that work will continue with the tine sled this week and that on Monday, October 2nd a determination will be made as to whether or not to stay in the test area or move to the mix area.

In response to a question by Jessica Jock, Paul LaRosa noted that while carbon is not being seen with the eye, TOC analysis is being run on both 0-3inches and 3-6inch samples. There is a possibility, however, that the carbon is being mixed deeper than this, but the data will tell the story as we move forward and critical path decisions will be made based on the data.

Next meeting will be October 3, 2006 at 10am.

Grasse River Activated Carbon Pilot Study

Weekly Progress Meeting
October 3, 2006

In attendance: Paul LaRosa, Ray Mangrum, Bill Moon, Heather VanDewalker, Dino Zack, Bruce Cook, Dan Casey, Jessica Jock, Paula Beattie

In attendance by phone: Jim Quadrini, Adrian Clough, Clay Patmont, Maheyar Bilimoria, Marc Greenberg, Sarah Hill, Mark Mahoney

Health and safety

Bill Moon reported that the contractor continues to perform daily and weekly inspections with no issues to report. The information and protocol regarding the man overboard with injury drill has been filed. Greg Rutherford from Alcoa has arrived and is performing a site audit with Bill Welch.

Action items from previous meetings

No action items to report.

Review of site operations

Ray Mangrum reported that work completed to date this week included three tine sled applications (i.e. "pulls") measuring 7 feet wide and 60 to 90 feet long within the initial testing area. The first pull applied a single carbon dose. The second pull applied a double carbon dose, which initially caused some of the injection nozzles to clog. This second pass was temporarily stopped until the nozzles could be cleared and a carbon slurry concentration prepared with additional water (i.e. lower percent solids, but same quantity of carbon). The second tine sled pull was completed with these modifications. The third tine sled pull was completed with a single dose of carbon.

Paul LaRosa noted that laboratory measurements of TOC and black carbon from the roto-tiller application within the initial testing area indicated that initially (prior to 9/29/06) carbon was likely being mixed deeper into the Grasse River sediments than planned (6 inches) and actually may have been mixed as deep as 18 inches below the mudline. The technical team identified the likely reason for this deeper mixing as a discrepancy between the actual mudline and the mudline as measured by Brennan in August 2006 using a single beam acoustical device, which was used prior to September 29 to set the elevation of the roto-tiller. The team verified this discrepancy by comparing the hydrographic surveyed elevation at a number of fixed points to that physically measured using an 18-inch square aluminum plate fixed to a survey rod, which enables accurate identification of the mudline. Initially, underwater video equipment was utilized to observe the contact of the aluminum plate with the mudline to ensure that the surveyor could consistently and accurately identify that contact by the change in resistance of the survey rod/plate as it was lowered through the water column. This methodology was performed on Friday, September 29 and provided confirmation that prior to September 29, the tiller was being set deeper than intended. Variations between the hydrographic survey and physical measurements ranged from approximately 0.4 to 1.2 feet.

Therefore, on Friday, with the new information and the supplemental survey method (survey rod and plate), the equipment operator was able to position the tiller appropriately in the vertical to compensate for the survey measurements. In addition, subsequent tiller applications were performed with the tiller positioned 0.3 feet above the "corrected" mudline, as measured using the survey rod.

The technical team also conducted underwater video monitoring during carbon placement, which indicated that carbon appeared to be settling through the water column and into the sediment without any significant observable downstream transport.

While the visual observations of post-application sediment cores were inconclusive during the initial days of the project (prior to September 29, 2006), observations from cores collected on and after September 29, 2006 indicate the presence of carbon in the top 6 inches. Although the TOC and black carbon laboratory analyses are not conclusive to date, the general trends are consistent with the increased visual observations following corrections to the vertical positioning during placement. Work will continue in the mixed treatment area using the roto-tiller method and the corrected mudline methodology with a dosing of carbon at 1-½ times the target to give the best chance for success.

The decision to select the roto-tiller moving forward is based on the fact that it has more accurate positioning control than the tine sled; the data is showing that elevation control is important and allows for better carbon dosage.

A technical discussion on methodology and analysis, and an overview of information forwarded to members by Clay Patmont ensued.

Paul LaRosa indicated that greater than expected quantities of carbon were used in the initial testing area due to the increased dose of carbon (2 times the targeted dose of 2.5% by weight). Therefore, Alcoa is currently investigating an additional source of to complete the project.

QA/QC monitoring

Dino Zack asked if the mudline corrections were being performed at each corner of the roto-tiller footprint or just at the center location. Bruce Cook explained that currently the physical surveying was being conducted at the center elevations of the mapped plots due generally flat nature of the study area and due to the time constraints of the project. Following the October 3, 2006 weekly meeting, Alcoa implemented QA/QC checks including surveying of multiple points within the tiller footprint as well as measurements by an independent surveyor at various points.

The group discussed the sediment coring locations relative to the tiller footprints. The technical team explained that the sampling locations were set up prior to the positioning of tiller footprints being used for injection, but additional "baseline" sediment data was being collected prior to carbon application where appropriate. Copies of the sample locations will be distributed with the plot plan for reference.

Environmental monitoring

Paul LaRosa discussed that BBL had an underwater video camera onsite on Friday, September 29th, as discussed above. The height of the tiller off the mudline, carbon deployment and mixing were all observed. There was very limited or no visible or measurable turbidity generated during mixing. The skirt surrounding the bottom of the tiller was lifted during application to observe the carbon distribution;, the carbon was observed settling into the soft surface sediments. This video provided additional physical confirmation that the carbon is being applied to the targeted sediments.

Jim Quadrini noted that all the PCB levels in water column samples collected for the project have been non-detect; turbidity and TSS measurements have also been low. These measurements do not indicate any evidence of water quality issues associated with the in-field work. Bruce Cook noted that turbidity was also measured inside the silt curtain just downstream of the tiller and those measurements are consistent with upstream background measurements.

Heather VanDewalker reported that the noise monitoring was performed upstream, downstream, and adjacent to the nearest residence and the measurements were equal to or less than some background readings that were taken prior to the initial application in the initial testing area. The frequency of noise monitoring has thus been reduced to once per week and/or if there is an event that seems to be generating a lot of noise.

Schedule

The contractor will continue to apply carbon in the mixed treatment area using the roto-tiller equipment. Based on current production rates, it is estimated that the mixed treatment area will be completed in 6 to 8 days. Once the mixed treatment area is complete, work will proceed to the un-mixed treatment area, which will take an estimated 4 to 5 days to complete. In response to a question by Dino Zack, if additional carbon is not found, Alcoa would only be able to continue river production for 7 to 8 days total; meaning that work would be stopped next week with only 2/3 of the area complete.

Next meeting Tuesday, October 10, 2006.

Grasse River Activated Carbon Pilot Study

Weekly Progress Meeting
October 10, 2006

In attendance: Paul LaRosa, Dan Casey, Ray Mangrum, Clay Patmont, Larry McShea, Sarah Hill, Heather VanDewalker, Dino Zack, Bruce Cook, Paula Beattie

Attending by phone: Leah Evison, Marc Greenberg, Dick Luthy, Maheyar Bilimoria, Jim Quadrini

Health and safety

Ray Mangrum reported that all the action items from the Alcoa audit are complete. Ray noted that the daily safety meetings continue with the emphasis on upcoming demobilization. All field coordination from all contractors has gone well throughout the project.

Action items from previous meetings

Dino Zack requested additional QA/QC surveying (i.e. using survey rod with large plate at bottom) at more than one location within each roto-tiller footprint. Brennan has begun periodically performing this additional surveying. In addition, BBL has been performing independent mudline elevations within several roto-tiller footprints and have confirmed the measurements by Brennan.

In response to Marc Greenburg's suggestion, the technical experts have been bringing resources together to consider other methods for measuring the amount of activated carbon applied to the Grasse River sediments. Although, the timeline of this project is such that new methodology will not be able to be utilized for field decisions, an alternate methodology may be utilized during the long-term monitoring component.

Larry Alden requested a more detailed bathymetry map with the sampling locations added. A revised map was provided including bathymetric contours with greater resolution; the information has not changed, it is has more color in the contour areas; the details are shown in the legend.

Review of site operations

Completed work to date in "Mixed Treatment Area":

Ray Mangrum reported that 90 footprints have been completed as of October 10, 2006; it is expected that 20 more will be completed today, completing the work in this area. Preparations will be made to move work to the unmixed treatment area. Due to time constraints, the technical team has decided not to apply activated carbon to the "row" of footprints closest to the shoreline and closest to the channel (a total of 26 footprints). This decision will not impact the future monitoring work planned for the project.

Currently, there are approximately 25 cores back from the lab; 25-55% of the samples in the 0-3 inches met the 2-3% carbon dosage. There is variability in the measurements, however, and a few of the samples are not showing the dosage hoped for. It is uncertain at this point if the variability is due to the analytical method being used or to small-scale field variability.

Following upland testing in Lacrosse, WI as part of Phase 1, it was thought that the tine sled would not perform as well as the roto-tiller, but the results of cores collected from the initial testing area in the Grasse River show that the tine sled was capable of more consistency achieving the target carbon dose in the top 3 inches than the roto-tiller. The tine sled was able to eliminate of some of the variability in observed with the roto-tiller; yielding 2-½% carbon in the top 3 inches consistently.

Paul LaRosa reported that the EPA has approved a plan to adjust the unmixed treatment area, which is downstream of the mixed area and upstream of the initial testing area, to accommodate use of the tine sled. The area will be 112′ long (parallel to river flow) by 50′ wide. the area will be subdivided into a mixed area measuring 60 feet by 50 feet and an unmixed area, measuring 40 feet by 50 feet, with a 12-foot by 50-foot buffer separating the two. Carbon will be applied in the mixed area using the tine sled and in the unmixed area using the roto-tiller equipment without the tiller engaged. There will be some additional stations for biological testing added to accommodate with change.

In response to a question from Leah Evison, Paul LaRosa noted that the team was able to locate an alternate carbon product to supplement the supply for the project. The alternate carbon is a coconut shell-based carbon, compared to the bituminous-based carbon initially used. Both materials are from the same supplier (Calgon Carbon Corp.) and are reportedly very similar products, with the similar grain size distribution. However, based on preliminary testing conducted at UMBC, the coconut shell-based appears to settle faster, which from an operation standpoint is beneficial. An ECN regarding the carbon change is currently being prepared to document this change.

Environmental monitoring

Heather VanDewalker reported that there has been no change in the non-detect results in TSS and turbidity; and that the noise is still at or below the baseline for the area. Jim Quadrini added that although the TSS levels are low, a consistent slight increase in TSS has been observed throughout the project at the downstream monitoring location. Further investigation and results are pending.

Video observations of the different operations have been taken throughout the project. The most recent video camera work was conducted during the pressure wave generated following the opening of the Snell Lock. The sediment surface was observed within an area immediately following activated carbon placement. Initially, it took approximately 10 minutes for the pressure wave to reach the area; this was evident by the silt curtain orientation change. A minimal increase in suspended bed load transport was observed. This video validated that the pressure wave is causing the re-suspension and transport of placed carbon outside of the study area. In response to a question by Dino Zack, Paul LaRosa reported that the silt curtain did move back into position in the reverse of the pressure wave;

1-week look ahead

Ray Mangrum noted that the mixed area should be complete today; with repositioning to the unmixed treatment area occurring after this. It is expected that application in the unmixed portion of this area will take 1 to 2 days. Application in the tine sled area is estimated to take approximately 1 to 2 days to complete the 8 pulls. It is expected that underwater video may be taken during the first few tine sled pulls, meaning they may take longer than the second set.

Demobilizing should begin on Monday or Tuesday of next week, with increased emphasis put on performing these types of tasks safely.

Last meeting to be Tuesday, October17th.

Grasse River Activated Carbon Pilot Study

Weekly Progress Meeting
October 17, 2006

Attending: Dan Casey, Ray Mangrum, Bill Moon, Paula Beattie

Attending by phone: Paul LaRosa, Clay Patmont, Sarah Hill, Heather VanDewalker, Dino Zack, Leah Evison, Marc Greenberg, Mayhaer Bilimoria, Jim Quadrini, Adrianne Clough, Jessica Jock

Health and safety

Ray Mangrum noted that the daily safety meetings will continue throughout demobilization.

Action items from previous meetings

None.

Review of site operations

Ray Mangrum reported that all in-river work had been completed as of 1:30 PM on Monday, October 16, 2006. This included removal of the turbidity curtain and anchors from the project site. The marine plants have been relocated to the St. Lawrence Seaway Development Corporation for demobilization. Most of equipment has been removed from the marine plants, with the exception of the storage containers.

Paul LaRosa summarized the results of the sampling data to date (preliminary draft circulated with meeting agenda). The results of the 5-point composite cores indicate that the placement equipment likely results in small scale spatial variability on the order of several inches to about 2 feet, although this variability is expected to be reduced by the benthic community. In response to a question from Jessica Jock, Paul briefly explained the "3 method average delta" metric presented on the data summary and its use for field decision making.

Dino Zack inquired about the results of analyses conducted on cores collected from cell 57 of the mixed tiller treatment area where the tiller was rotated 90 degrees following the carbon application and initial mixing. Paul LaRosa responded that the results did not indicate a significant increase in the amount of activated carbon measured or the spatial variability within the application cells as measured through 5 sampling locaitons. Therefore, the remaining application cells in the mixed tiller treatment area were performed with only a single mixing event.

Environmental monitoring

Jim Quadrini summarized the environmental monitoring for the project as a whole and reported that the project did not result in a significant effect on downstream water quality. No measurable changes in water column PCBs were observed adjacent to or downstream of the ACPS area during activated carbon application. Leah Evison asked whether the water quality monitoring data indicate that the silt curtain was necessary to ensure downstream water quality. Jim responded that the results suggest that the silt may not be necessary for similar applications in the future given that the monitoring results inside the silt curtain and immediately adjacent to the placement equipment were well within the project limits.

1-week look ahead

Ray Mangrum noted that all demobilization activities will be complete by October 20, 2006.

No future project meetings are currently planned.

Larry McShea and Young Chang will coordinate on the schedule for submittal of the construction documentation report and future reports of the long-term monitoring results, as they are available.

APPENDIX F

ENGINEERING CHANGE NOTICES

NO. 1 – UNMIXED TREATMENT AREA

Grasse River Activated Carbon Pilot Study
Engineering Change Notice

Change Number: 1 **Date:** October 9, 2006
Originator: Paul LaRosa

Change Notification: This Engineering Change Notice serves as notification to the USEPA by Alcoa of a request to modify the scope of work for the Grasse River Activated Carbon Pilot Study.

Basis for Change: See attached

Schedule Impact/Documents Affected: There are no anticipated impacts to the overall project schedule resulting from this change.

Resolution: N/A

Level of Approval Required[1]**:** Notification only to USEPA ☐
Approval of USEPA Project Manager (with appropriate Agency review) ☒

Approval/Acceptance (as necessary):
Alcoa Representative: Paul LaRosa Date: 10/9/06
Agency On-Site Representative: Dino J. Zack Date: 10/9/06
USEPA Project Manager: ____ Date: ____
(if necessary)

Distribution: Young Chang, USEPA; Dino Zack, USEPA Rep.; Dan Casey, BBL; Ray Mangrum, TtEC; Clay Patmont, Anchor; Lawrence McShea, Alcoa; Heather VanDewalker, BBL; Paul LaRosa, Anchor; James Quadrini, QEA; Bruce Cook, Alcoa

[1] Level of approval required will be based on type of change being requested. Minor adjustments (e.g., movement of sampling locations, times) will require Agency notification only and not approval. Significant changes will require Agency approval.

In-Situ PCB Bioavailability Reduction in Grasse River Sediments
Grasse River Study Area, Massena, New York
Revisions to Final Work Plan
October 2006

This memorandum presents proposed revisions to the Final Work Plan for the Activated Carbon Pilot Study (ACPS) of In-Situ PCB Bioavailability Reduction in Grasse River Sediments, Grasse River Study Area in Massena, New York. Revisions to the Work Plan, as described herein, were necessitated based on the results of recent data collection activities performed as part of the Phase 2 implementation of the pilot project. A brief summary of the sediment core sampling results collected as part of the ACPS through October 4, 2005 is provided below. This data has been evaluated by Alcoa and the technical team and used to develop appropriate revisions to the Work Plan to accomplish the stated goals of the project.

Preliminary Results of Sediment Cores from Initial Testing Area

As discussed in the Work Plan approved by EPA in August 2006, Phase 2 placement of activated carbon (AC) within the Grasse River began in the most downstream portion of the study area within the "initial testing area". Within this initial testing area, the operating procedures of the AC placement equipment (roto-tiller and tine sled) were refined to match the site conditions within the Grasse River. In addition, the initial testing area was used to evaluate the performance of the two pieces of equipment relative to the project goals and to each other to determine which equipment is most suited for subsequent use in the mixed and unmixed treatment areas.

As discussed at the project meeting on October 3, 2006, the ability of the equipment to apply carbon to the sediments was evaluated by collecting sediment cores and submitting samples for laboratory analysis of total organic carbon (TOC) and "black carbon". Due to the large spatial variability in organic carbon naturally present in the Grasse River (i.e. "baseline" conditions), an accurate determination of the amount of AC added has been difficult to measure by comparing post-application with baseline TOC samples. In comparison, the variability of naturally occurring black carbon in the Grasse River sediments is significantly less, but the analytical method is currently being refined to provide more accurate results. Therefore, the technical team has continued to evaluate the results of both the standard TOC analysis (Lloyd Kahn method) and the black carbon analysis. Table 1 presents a summary of the observed surface sediment concentration increase in TOC and black carbon above the measured background values. This summary does not include data collected prior to August 29, 2006 after which operational modifications were made that significantly improved the performance of the equipment to apply AC to the surface sediments of the Grasse River. The complete data set of samples collected within the initial testing area is presented as an attachment to this memorandum along with a map that presents the locations of each sample within the initial testing area. A summary of these data is provided below.

Table 1. Preliminary Summary of AC Application Data

AC Application Method	Increase in TOC Concentration Post Application [a]	Increase in Black Carbon Conc. Post Application [a,b]
Mixed Roto-Tiller	1.7% +/- 0.5%	2.2% +/- 0.5%
Unmixed Roto-Tiller	0.9% +/- 0.5%	1.3% +/- 0.6%
Tine Sled	3.2% +/- 0.4%	2.6% +/- 0.7%

Notes:

a. TOC and black carbon concentrations are based on dry weight vales for surface sediments (0-3" for roto-tiller; 0-6" for tine sled)

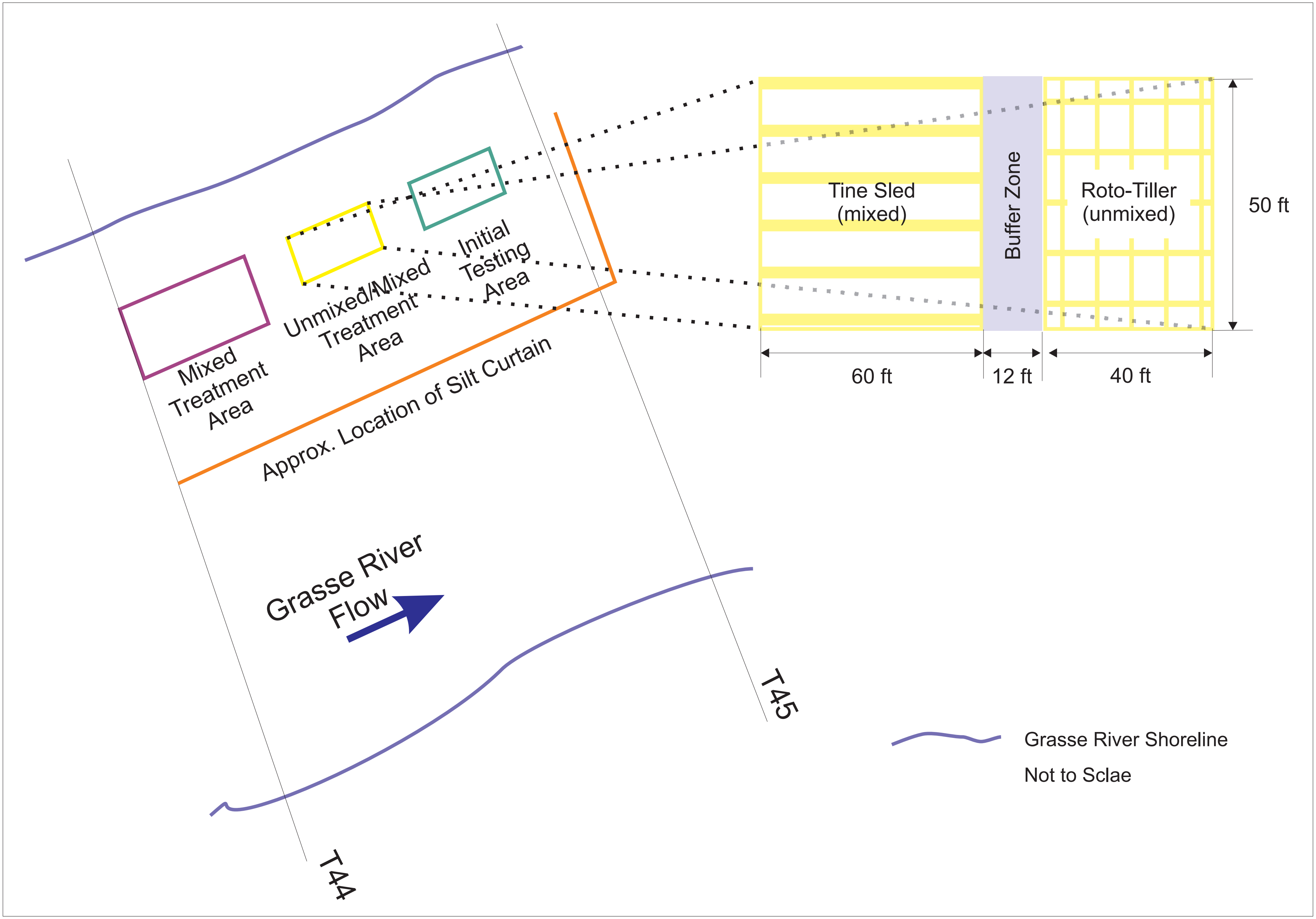
b. Values adjusted based on preliminary laboratory matrix spike recoveries

Based on the results of Phase 1 testing and analysis of sediment cores collected in the initial Grasse River testing area, Alcoa elected to utilize the roto-tiller device in the mixed treatment area and began application on October 3, 2006. Following that decision, additional data was received from sediment cores collected within the tine sled application area of the initial testing area. Review of that data indicates that both the roto-tiller (mixed application) and tine sled achieved similar success in applying the target dose of AC to the sediments, while the unmixed roto-tiller application appeared to be comparatively less effective in delivering AC into surface sediments. Based on these findings, application of the roto-tiller to the mixed treatment area will continue as originally planned. However, Alcoa proposes to subdivide the unmixed treatment area to accommodate further testing of both the tine sled and roto-tiller (unmixed application) as part of the Phase 2 study. An overview of the proposed changes is provided below.

Proposed Revisions to ACPS Work Scope

Based on the results from the initial test area described above, Alcoa proposes to modify the Work Plan in the unmixed treatment area to gather additional data relative to the tine sled application. Alcoa proposes to subdivide the unmixed treatment area, which currently measures 50 feet by 100 feet, into two sub-areas as presented on Figure 1. The upstream sub-area, measuring 50 feet by 60 feet would be designated for "mixed" application using the tine sled. The downstream sub-area, measuring 50 feet by 40 feet, would remain as an unmixed treatment (using the roto-tiller device without engaging the tiller), as discussed in the Work Plan. In addition, Alcoa proposes to expand this area by approximately 12 feet in the downstream direction in order to accommodate a12-foot-wide buffer area between the tine sled and roto-tiller areas, as shown on Figure 1.

Alcoa also plans to augment the existing monitoring program, including three additional ex situ and in situ PCB uptake studies, to provide further information on the relative performance of the different application methods. Provided that this revised scoped is approved by EPA by October 10, Alcoa will implement these proposed revisions. Details of the augmented monitoring plan would then be provided in a subsequent technical memorandum.



ALCOA

Figure 1 - Revised Study Area
Grasse River Activated Carbon Pilot Study

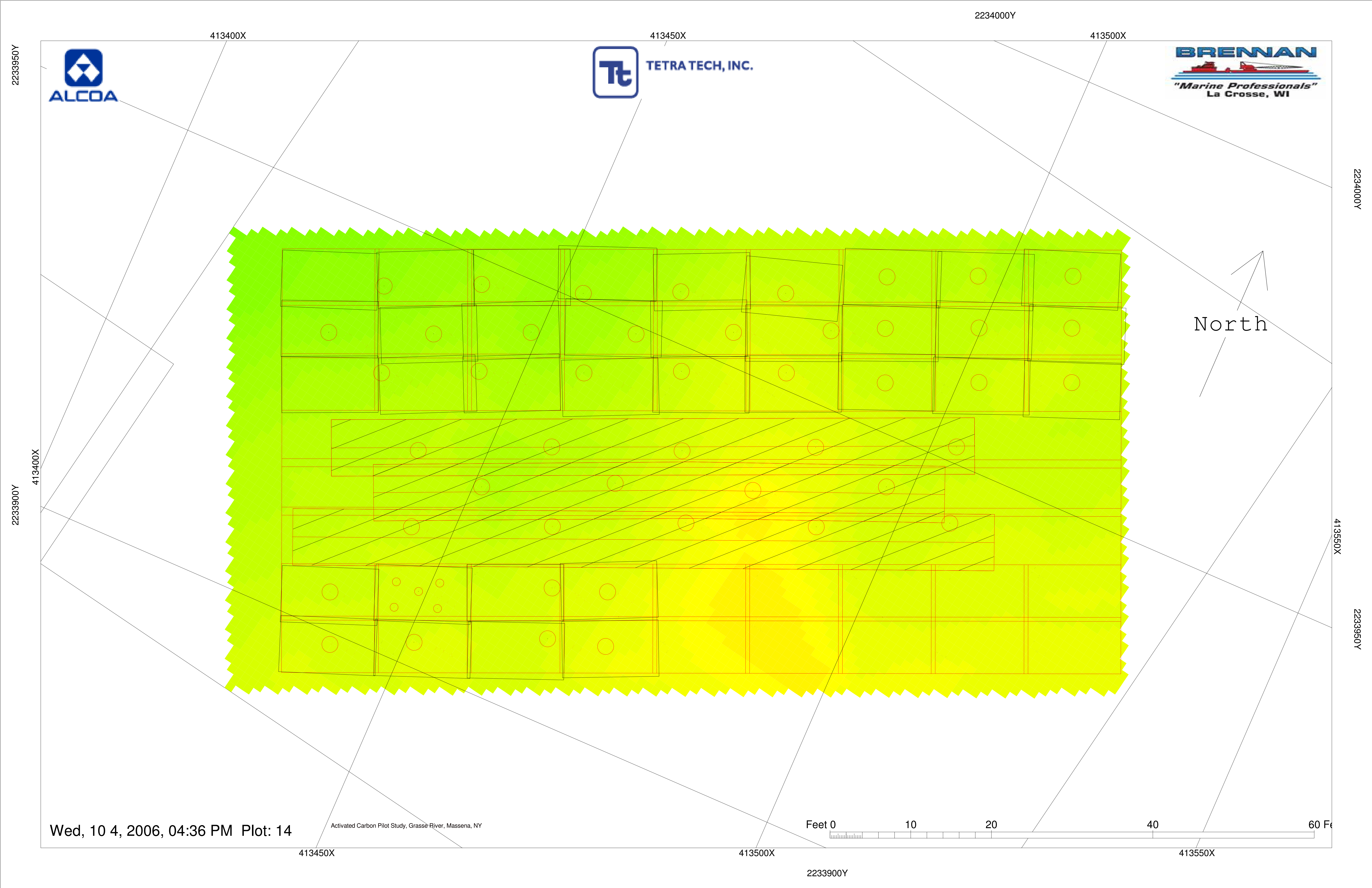
Attachment
Sediment Core Data

PRELIMINARY ACPS Phase 2 Initial Testing Post-Application Sediment Results - October 6, 2006 Update
Grasse River 2006 Activated Carbon Pilot Study
Massena, New York

Test	Date Sampled	Brennan Grid ID	Core Station ID	Carbon Application Description	Depth Interval (inches)	Dry Density (g DW/cm^3)	Total Organic Carbon (% DW)			Black Carbon (% DW)		
							Baseline [a]	After	Conc. Delta	Baseline [a]	After	Conc. Delta
Baseline Measurements												
	9/14	TU1-N2	TM-01	Prior to Application	0 - 3	0.40	6.10%			0.79%		
	9/14	TU2-N1	TM-02	Prior to Application	0 - 3	0.39	4.30%			0.86%		
	9/14	TU1-N2	TM-03	Prior to Application	0 - 3	0.43	4.90%			0.88%		
	9/14	TU1-N2	TM-03	Prior to Application	3 - 6	0.43	4.40%			0.79%		
	9/14	TU2-N2	TM-04	Prior to Application	0 - 3	0.42	4.60%			0.82%		
	9/14	TU3-N1	TM-05	Prior to Application	0 - 3	0.39	3.90%			0.91%		
	9/14	TU3-N3	TM-06	Prior to Application	0 - 3	0.43	3.90%			0.76%		
	9/14	TU3-N2	TM-07	Prior to Application	0 - 3	0.44	7.10%			0.82%		
	9/14	TU4-N1	TM-08	Prior to Application	0 - 3	0.39	5.80%			0.74%		
	9/14	TU4-N3	TM-09	Prior to Application	0 - 3	0.42	3.90%			0.78%		
	9/14	TU4-N2	TM-10	Prior to Application	0 - 3	0.39	5.40%			0.78%		
	9/14	TU5-N1	TM/TU-11	Prior to Application	0 - 3	0.36	5.90%			0.80%		
	9/14	TU5-N3	TM/TU-12	Prior to Application	0 - 3	0.41	5.70%			0.91%		
	9/14	TU5-N2	TM/TU-13	Prior to Application	0 - 3	0.35	5.60%			0.72%		
	9/14	TU6-N1	TM-14	Prior to Application	0 - 3	--	5.40%			0.84%		
	9/14	TU6-N3	TM-15	Prior to Application	0 - 3	--	5.80%			0.76%		
	9/14	TU6-N2	TM-16	Prior to Application	0 - 3	--	5.00%			0.64%		
	9/13	--	AM-2	Prior to Application	0 - 3	--	7.80%			0.95%		
	9/13	--	AM-2	Prior to Application	3 - 6	--	7.30%			1.10%		
	9/13	--	AM-3	Prior to Application	0 - 3	--	2.90%			1.00%		
	9/13	--	AM-3	Prior to Application	3 - 6	--	4.90%			0.97%		
	9/13	--	AM-5	Prior to Application	0 - 3	--	6.30%			0.97%		
	9/13	--	AM-5	Prior to Application	3 - 6	--	6.30%			1.00%		
	9/13	--	AM-6	Prior to Application	0 - 3	--	4.00%			1.10%		
	9/13	--	AM-6	Prior to Application	3 - 6	--	4.90%			0.95%		
	9/12	MAU2-N6	MTA-01	Prior to Application	0 - 3	0.40	6.40%					
	9/28	MAU2-N6	MTA-01	Prior to Application	0 - 6	0.37	6.30%			0.80%		
	9/28	MAU2-N6	MTA-01	Prior to Application	6 - 12	0.48	6.10%			0.94%		
	9/28	MAU2-N6	MTA-01	Prior to Application	12 - 18	0.49	6.30%			1.10%		
	9/28	MAU2-N6	MTA-01	Prior to Application	18 - 22	0.51	6.40%			1.30%		
	9/12	MAU2-N6	MTA-01	Prior to Application	3 - 6	0.47	4.20%					
	9/12	MAU3-N3	MTA-02	Prior to Application	0 - 3	0.42	6.10%					
	9/12	MAU3-N3	MTA-02	Prior to Application	3 - 6	0.51	5.40%					
	9/12	MAU3-N9	MTA-03	Prior to Application	0 - 3	0.42	4.10%					
	9/12	MAU3-N9	MTA-03	Prior to Application	3 - 6	0.50	5.60%					
	9/12	MAU4-N6	MTA-04	Prior to Application	0 - 3	0.37	5.60%					
	9/12	MAU4-N6	MTA-04	Prior to Application	3 - 6	0.39	4.20%					
	9/12	MAU5-N3	MTA-05	Prior to Application	0 - 3	0.46	5.00%					
	9/12	MAU5-N3	MTA-05	Prior to Application	3 - 6	0.47	6.40%					
	9/12	MAU5-N9	MTA-06	Prior to Application	0 - 3	0.49	4.10%					
	9/12	MAU5-N9	MTA-06	Prior to Application	3 - 6	0.49	4.40%					
	9/12	MAU6-N6	MTA-07	Prior to Application	0 - 3	0.35	6.10%					
	9/12	MAU6-N6	MTA-07	Prior to Application	3 - 6	0.43	3.80%					
	9/12	MAU7-N3	MTA-08	Prior to Application	0 - 3	0.41	7.10%					
	9/12	MAU7-N3	MTA-08	Prior to Application	3 - 6	0.43	6.60%					
	9/12	MAU7-N9	MTA-09	Prior to Application	0 - 3	0.53	4.30%					
	9/12	MAU7-N9	MTA-09	Prior to Application	3 - 6	0.41	4.10%					
	9/12	MAU8-N6	MTA-10	Prior to Application	0 - 3	0.36	5.10%					
	9/12	MAU8-N6	MTA-10	Prior to Application	3 - 6	0.45	4.70%					
	9/12	MAU9-N3	MTA-11	Prior to Application	0 - 3	0.42	5.80%					
	9/12	MAU9-N3	MTA-11	Prior to Application	3 - 6	0.42	6.70%					
	9/12	MAU9-N9	MTA-12	Prior to Application	0 - 3	0.43	4.70%					
	9/12	MAU9-N9	MTA-12	Prior to Application	3 - 6	0.45	5.60%					
	9/12	MAU10-06	MTA-13	Prior to Application	0 - 3	0.38	5.40%					
	9/12	MAU10-06	MTA-13	Prior to Application	3 - 6	0.45	5.60%					
	9/12	MAU11-N3	MTA-14	Prior to Application	0 - 3	0.40	7.00%					
	9/12	MAU11-N3	MTA-14	Prior to Application	3 - 6	0.48	6.50%					
	9/12	MAU11-N9	MTA-15	Prior to Application	0 - 3	0.38	5.45%					
	9/12	MAU11-N9	MTA-15	Prior to Application	3 - 6	0.40	6.60%					
	9/12	MAU12-N6	MTA-16	Prior to Application	0 - 3	0.43	4.90%					
	9/12	MAU12-N6	MTA-16	Prior to Application	3 - 6	0.41	5.20%					

Test	Date Sampled	Brennan Grid ID	Core Station ID	Carbon Application Description	Depth Interval (inches)	Dry Density (g DW/cm^3)	Total Organic Carbon (% DW)			Black Carbon (% DW)		
							Baseline [a]	After	Conc. Delta	Baseline [a]	After	Conc. Delta
Tiller Mixed Testing												
	9/26	TU1-N2	TM-01	Single Dose; Tiller Postioned	0 - 3	0.40	6.10%	7.80%	1.70%	0.79%	0.69%	-0.10%
	9/26	TU1-N2	TM-01	~0.2' below "Brennan Mudline"	3 - 6	0.45	5.70%	7.00%		0.79%	1.20%	
	9/26	TU2-N1	TM-02		0 - 3	0.39	4.30%	7.10%	2.80%	0.86%	1.40%	0.54%
	9/26	TU2-N1	TM-02		3 - 6	0.43	4.00%	7.40%		0.86%	1.20%	
	9/28	TU2-N1	TM-02	Single Dose; Tiller Postioned	0 - 6	0.43	4.15%	5.00%	0.85%	0.86%	0.91%	
	9/28	TU2-N1	TM-02	~0.2' below "Brennan Mudline"	6 - 12	0.44	*6.10%*	6.60%		*0.94%*	0.87%	
	9/28	TU2-N1	TM-02		12 - 18	0.51	*6.30%*	6.20%		*1.10%*	1.10%	
	9/28	TU2-N1	TM-02		18 - 24	0.45	*6.40%*	8.80%		*1.30%*	2.60%	
	9/26	TU1-N3 / TU2-N3	TM-03	Single Dose; Tiller Postioned	0 - 3	0.43	4.90%	6.30%	1.40%	0.88%	1.80%	0.92%
	9/26	TU1-N3 / TU2-N3	TM-03	~0.2' below "Brennan Mudline"	3 - 6	0.43	4.40%	6.90%		0.79%	1.10%	
	9/26	TU2-N2	TM-04	Single Dose; Tiller Postioned	0 - 3	0.42	4.60%	5.70%	1.10%	0.82%	1.25%	0.43%
	9/26	TU2-N2	TM-04	~0.2' below "Brennan Mudline"	3 - 6	0.49	4.60%	5.80%		0.82%	1.30%	
	9/26	TU3-N1	TM-05	Single Dose; Tiller Postioned	0 - 3	0.39	3.90%	6.90%	3.00%	0.91%	0.76%	-0.15%
	9/26	TU3-N1	TM-05	~0.2' below "Brennan Mudline"	3 - 6	0.43	4.80%	7.20%		0.91%	0.73%	
	9/26	TU3-N3	TM-06	Single Dose; Tiller Postioned	0 - 3	0.43	3.90%	6.30%	2.40%	0.76%	0.93%	0.17%
	9/26	TU3-N3	TM-06	~0.2' below "Brennan Mudline"	3 - 6	0.56	4.10%	5.50%		0.76%	0.60%	
	9/26	TU3-N2	TM-07	Single Dose; Tiller Postioned	0 - 3	0.44	7.10%	5.40%	-1.70%	0.82%	0.83%	0.01%
	9/26	TU3-N2	TM-07	~0.2' below "Brennan Mudline"	3 - 6	0.46	4.50%	6.10%		0.82%	0.77%	
	9/26	TU4-N1	TM-08	Double Dose; Tiller Postioned	0 - 3	0.39	5.80%	6.00%	0.20%	0.74%	1.80%	1.06%
	9/26	TU4-N1	TM-08	~0.2' below "Brennan Mudline"	3 - 6	0.46	6.70%	3.70%		0.74%	0.85%	
	9/26	TU4-N3	TM-09		0 - 3	0.42	3.90%	6.20%	2.30%	0.78%	0.85%	0.07%
	9/26	TU4-N3	TM-09		3 - 6	0.45	4.40%	5.90%		0.78%	0.79%	
	9/26	TU4-N3	TM-09	Double Dose; Tiller Postioned	0 - 6	0.43	4.15%	6.30%	2.15%	0.78%	1.60%	0.82%
	9/28	TU4-N3	TM-09	~0.2' below "Brennan Mudline"	6 - 12	0.50	*6.10%*	6.20%		*0.94%*	0.76%	
	9/28	TU4-N3	TM-09		12 - 18	0.53	*6.30%*	5.90%		*1.10%*	1.00%	
	9/28	TU4-N3	TM-09		18 - 22	0.50	*6.40%*	5.50%		*1.30%*	2.30%	
	9/26	TU4-N2	TM-10	Double Dose; Tiller Postioned	0 - 3	0.39	5.40%	4.80%	-0.60%	0.78%	1.00%	0.22%
	9/26	TU4-N2	TM-10	~0.2' below "Brennan Mudline"	3 - 6	0.52	4.60%	4.70%		0.78%	0.64%	
	9/29	TU6-N3	TM-15		0 - 3	0.37	5.80%	6.90%	1.10%	0.76%	0.89%	0.13%
	9/29	TU6-N3	TM-15	Single Dose; Tiller Positioned ~0.3' above Sediment Bed	3 - 6	0.62	5.80%	4.60%		0.76%	0.47%	
	9/29	TU6-N3	TM-15		6 - 12	0.51	*6.10%*	5.60%		*0.94%*	0.62%	
	9/29	TU6-N2	TM-16		0 - 3	0.35	5.00%	7.00%	2.00%	0.64%	1.40%	0.76%
	9/29	TU6-N2	TM-16	Single Dose; Tiller Positioned ~0.3' above Sediment Bed	3 - 6	0.61	5.00%	4.60%		0.64%	0.44%	
	9/29	TU6-N2	TM-16		6 - 12	0.51	*6.10%*	5.20%		*0.94%*	0.44%	
	9/29	TU7-N1	TM-17		0 - 3	0.39	*5.37%*	8.40%	3.03%	*0.89%*	1.80%	0.91%
	9/29	TU7-N1	TM-17	Double Dose; Tiller Positioned ~0.3' above Sediment Bed	3 - 6	0.62	*5.37%*	5.20%		*0.89%*	0.43%	
	9/29	TU7-N1	TM-17		6 - 12	0.57	*6.10%*	5.60%		*0.94%*	0.56%	
	9/29	TU7-N2	TM-18		0 - 3	0.40	*5.37%*	5.85%	0.48%	*0.89%*	0.83%	-0.06%
	9/29	TU7-N2	TM-18	Double Dose; Tiller Positioned ~0.3' above Sediment Bed	3 - 6	0.54	*5.37%*	4.80%		*0.89%*	0.51%	
	9/29	TU7-N2	TM-18		6 - 12	0.49	*6.10%*	5.50%		*0.94%*	0.67%	
	9/29	TU7-N3	TM-19		0 - 3	0.38	*5.37%*	7.00%	1.63%	*0.89%*	1.20%	0.31%
	9/29	TU7-N3	TM-19	Single Dose; Tiller Positioned ~0.3' above Sediment Bed	3 - 6	0.46	*5.37%*	5.50%		*0.89%*	0.56%	
	9/29	TU7-N3	TM-19		6 - 12	0.53	*6.10%*	5.80%		*0.94%*	0.70%	
	10/2	TU8-N1	TM-20		0 - 3	0.47	*5.37%*	4.70%	-0.67%	*0.89%*	0.80%	-0.09%
	10/2	TU8-N1	TM-20	Double Dose; Tiller Positioned ~0.3' above Sediment Bed	3 - 6	0.81	*5.37%*	2.40%		*0.89%*	0.36%	
	10/2	TU8-N1	TM-20		6 - 12	0.57	*6.10%*	4.40%		*0.94%*	0.82%	
	10/3	TU2-N4	AM-02	Double Dose; Tiller Positioned	0 - 3	0.34	7.80%	6.50%	-1.30%	0.95%	2.20%	1.25%
	10/3	TU2-N4	AM-02	~0.3' above Sediment Bed	3 - 6	0.47	7.30%	5.20%		1.10%	0.89%	
	10/3	TU2-N4	AM-02A	Double Dose; Tiller Positioned	0 - 3	0.37	*5.37%*	5.90%	0.53%	*0.89%*	0.24%	-0.65%
	10/3	TU2-N4	AM-02A	~0.3' above Sediment Bed	3 - 6	0.42	*5.37%*	4.20%		*0.89%*	0.33%	
	10/3	TU2-N4	AM-02B	Double Dose; Tiller Positioned	0 - 3	0.34	*5.37%*	3.80%	-1.57%	*0.89%*	0.29%	-0.60%
	10/3	TU2-N4	AM-02B	~0.3' above Sediment Bed	3 - 6	0.41	*5.37%*	6.50%		*0.89%*	0.77%	
	10/3	TU2-N4	AM-02C	Double Dose; Tiller Positioned	0 - 3	0.36	*5.37%*	5.90%	0.53%	*0.89%*	2.30%	1.41%
	10/3	TU2-N4	AM-02C	~0.3' above Sediment Bed	3 - 6	0.43	*5.37%*	3.80%		*0.89%*	0.81%	
	10/3	TU2-N4	AM-02D	Double Dose; Tiller Positioned	0 - 3	0.33	*5.37%*	6.80%	1.43%	*0.89%*	3.70%	2.81%
	10/3	TU2-N4	AM-02D	~0.3' above Sediment Bed	3 - 6	0.34	*5.37%*	6.70%		*0.89%*	1.10%	
	10/3	TU2-N5	AM-03	Double Dose; Tiller Positioned	0 - 3	0.41	2.90%	7.60%	4.70%	1.00%	3.70%	2.70%
	10/3	TU2-N5	AM-03	~0.3' above Sediment Bed	3 - 6	0.35	4.90%	8.00%		0.97%	3.80%	
	10/3	TU3-N4	AM-05	Double Dose; Tiller Positioned	0 - 3	0.31	6.30%	6.40%	0.10%	0.97%	1.40%	0.43%
	10/3	TU3-N4	AM-05	~0.2' above Sediment Bed	3 - 6	0.43	6.30%	6.90%		1.00%	1.00%	
	10/3	TU3-N5	AM-06	Double Dose; Tiller Positioned	0 - 3	0.34	4.00%	6.20%	2.20%	1.10%	1.00%	-0.10%
	10/3	TU3-N5	AM-06	~0.2' above Sediment Bed	3 - 6	0.46	4.90%	5.10%		0.95%	0.63%	
	10/3	TU1-N4	AM-17	Double Dose; Tiller Positioned	0 - 3	0.32	*5.37%*	8.00%	2.63%	*0.89%*	1.80%	0.91%
	10/3	TU1-N4	AM-17	~0.3' above Sediment Bed	3 - 6	0.40	*5.37%*	6.10%		*0.89%*	1.00%	
	10/3	TU1-N5	AM-18	Double Dose; Tiller Positioned	0 - 3	0.31	*5.37%*	8.90%	3.53%	*0.89%*	2.80%	1.91%
	10/3	TU1-N5	AM-18	~0.3' above Sediment Bed	3 - 6	0.37	*5.37%*	6.00%		*0.89%*	1.10%	
	10/3	TU4-N4	AM-19	Double Dose; Tiller Positioned	0 - 3	0.37	*5.37%*	8.30%	2.93%	*0.89%*	2.90%	2.01%
	10/3	TU4-N4	AM-19	~0.2' above Sediment Bed	3 - 6	0.46	*5.37%*	6.80%		*0.89%*	0.79%	
	10/3	TU4-N5	AM-20	Double Dose; Tiller Positioned	0 - 3	0.30	*5.37%*	9.80%	4.43%	*0.89%*	3.10%	2.21%
	10/3	TU4-N5	AM-20	~0.2' above Sediment Bed	3 - 6	0.31	*5.37%*	4.50%		*0.89%*	1.20%	
	10/4	MAU2-N6	MTA-01	1.5X Dose; Tiller Positioned ~0.3'	0 - 3	0.36	6.40%	6.30%	-0.10%	0.80%	0.97%	0.17%
	10/4	MAU2-N6	MTA-01	above Sediment Bed; 7 RPM	3 - 6	0.49	4.20%	5.00%		0.80%	0.61%	
	10/4	MAU3-N3	MTA-02	1.5X Dose; Tiller Positioned ~0.3'	0 - 3	0.34	6.10%	12.00%	5.90%	*0.89%*	4.30%	3.41%
	10/4	MAU3-N3	MTA-02	above Sediment Bed; 7 RPM	3 - 6	0.44	5.40%	4.30%		*0.89%*	0.60%	

Test	Date Sampled	Brennan Grid ID	Core Station ID	Carbon Application Description	Depth Interval (inches)	Dry Density (g DW/cm^3)	Total Organic Carbon (% DW)			Black Carbon (% DW)		
							Baseline [a]	After	Conc. Delta	Baseline [a]	After	Conc. Delta
	10/4	MAU3-N9	MTA-03	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 7 RPM	0 - 3	0.35	4.10%	8.30%	4.20%	*0.89%*	2.20%	1.31%
	10/4	MAU3-N9	MTA-03		3 - 6	0.47	5.60%	3.70%		*0.89%*	0.70%	
	10/4	MAU4-N2	MTA-17	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM	0 - 3	0.33	*5.37%*	5.40%	0.03%	*0.89%*	0.92%	0.03%
	10/4	MAU4-N2	MTA-17		3 - 6	0.46	*5.37%*	18.00%		*0.89%*	0.74%	
	10/4	MAU4-N2	MTA-17A	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM	0 - 3	0.33	*5.37%*	5.30%	-0.07%	*0.89%*	1.50%	0.61%
	10/4	MAU4-N2	MTA-17A		3 - 6	0.47	*5.37%*	5.20%		*0.89%*	0.75%	
	10/4	MAU4-N2	MTA-17B	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM	0 - 3	0.28	*5.37%*	6.00%	0.63%	*0.89%*	1.30%	0.41%
	10/4	MAU4-N2	MTA-17B		3 - 6	0.45	*5.37%*	4.40%		*0.89%*	0.80%	
	10/4	MAU4-N2	MTA-17C	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM	0 - 3	0.32	*5.37%*	4.70%	-0.67%	*0.89%*	1.20%	0.31%
	10/4	MAU4-N2	MTA-17C		3 - 6	0.48	*5.37%*	4.40%		*0.89%*	0.82%	
	10/4	MAU4-N2	MTA-17D	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM	0 - 3	0.31	*5.37%*	5.10%	-0.27%	*0.89%*	1.00%	0.11%
	10/4	MAU4-N2	MTA-17D		3 - 6	0.42	*5.37%*	5.30%		*0.89%*	0.57%	
	10/4	MAU5-N2	MTA-18	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM w/ add'l mix at 90deg. rot.	0 - 3	0.33	*5.37%*	5.10%	-0.27%	*0.89%*	1.20%	0.31%
	10/4	MAU5-N2	MTA-18		3 - 6	0.43	*5.37%*	5.50%		*0.89%*	0.69%	
	10/4	MAU5-N2	MTA-18A	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM w/ add'l mix at 90deg. rot.	0 - 3	0.32	*5.37%*	7.30%	1.93%	*0.89%*	1.70%	0.81%
	10/4	MAU5-N2	MTA-18A		3 - 6	0.46	*5.37%*	4.60%		*0.89%*	0.98%	
	10/4	MAU5-N2	MTA-18B	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM w/ add'l mix at 90deg. rot.	0 - 3	0.40	*5.37%*	15.00%	9.63%	*0.89%*	5.60%	4.71%
	10/4	MAU5-N2	MTA-18B		3 - 6	0.43	*5.37%*	5.80%		*0.89%*	0.78%	
	10/4	MAU5-N2	MTA-18C	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM w/ add'l mix at 90deg. rot.	0 - 3	0.29	*5.37%*	7.20%	1.83%	*0.89%*	1.90%	1.01%
	10/4	MAU5-N2	MTA-18C		3 - 6	0.45	*5.37%*	5.30%		*0.89%*	0.67%	
	10/4	MAU5-N2	MTA-18D	1.5X Dose; Tiller Positioned ~0.3' above Sediment Bed; 12 RPM w/ add'l mix at 90deg. rot.	0 - 3	0.30	*5.37%*	11.00%	5.63%	*0.89%*	5.50%	4.61%
	10/4	MAU5-N2	MTA-18D		3 - 6	0.46	*5.37%*	4.30%	-1.07%	*0.89%*	0.74%	
Tiller Unmixed Testing												
	9/26	MAU3-N9	TM/TU-11	Double Dose; Tiller Postioned ~0.2' below "Brennan Mudline"	0 - 3	0.36	5.90%	5.65%	-0.25%	0.80%	0.60%	-0.21%
	9/28	TU5-N1	TM/TU-11		0 - 6	0.40	5.90%	6.50%	0.60%	0.80%	1.30%	0.50%
	9/28	TU5-N1	TM/TU-11		6 - 12	0.47	*6.10%*	18.00%		*0.94%*	0.68%	
	9/28	TU5-N1	TM/TU-11		12 - 18	0.47	*6.30%*	5.40%		*1.10%*	0.88%	
	9/28	TU5-N1	TM/TU-11		18 - 19	0.41	*6.40%*	6.30%		*1.30%*	1.20%	
	9/26	TU5-N3	TM/TU-12	Double Dose; Tiller Postioned ~0.2' below "Brennan Mudline"	0 - 3	0.41	5.70%	5.65%	-0.05%	0.91%	1.20%	0.29%
	9/26	TU5-N2	TM/TU-13	Double Dose; Tiller Postioned ~0.2' below "Brennan Mudline"	0 - 3	0.35	5.60%	5.65%	0.05%	0.72%	0.92%	0.20%
	9/29	TU6-N1	TU-14/TM-14	Single Dose; Tiller Positioned ~1.5' above Sediment Bed	0 - 3	0.47	*5.37%*	6.30%	0.93%	0.84%	0.57%	-0.27%
	9/29	TU6-N1	TU-14/TM-14		3 - 6	0.59	*5.37%*	5.30%		0.84%	0.46%	
	9/29	TU6-N1	TU-14/TM-14		6 - 12	0.55	*6.10%*	5.70%		*0.94%*	0.36%	
	10/2	TU8-N2	TM-21/TU-21	Double Dose; Tiller Positioned ~0.3' above Sediment Bed	0 - 3	0.40	*5.37%*	5.80%	0.43%	*0.89%*	2.10%	1.21%
	10/2	TU8-N2	TM-21/TU-21		3 - 6	0.55	*5.37%*	3.80%		*0.89%*	0.42%	
	10/2	TU8-N2	TM-21/TU-21		6 - 12	0.54	*6.10%*	5.20%		*0.94%*	0.75%	
	10/2	TU8-N3	TM-22/TU-22	Double Dose; Tiller Positioned ~0.3' above Sediment Bed	0 - 3	0.32	*5.37%*	5.20%	-0.17%	*0.89%*	1.00%	0.11%
	10/2	TU8-N3	TM-22/TU-22		3 - 6	0.62	*5.37%*	4.10%		*0.89%*	0.76%	
	10/2	TU8-N3	TM-22/TU-22		6 - 12	0.51	*6.10%*	3.90%		*0.94%*	0.79%	
	10/2	TU9-N1	TM-23/TU-23	Single Dose; Tiller Positioned ~0.3' above Sediment Bed	0 - 3	0.48	*5.37%*	5.50%	0.13%	*0.89%*	1.50%	0.61%
	10/2	TU9-N1	TM-23/TU-23		3 - 6	0.62	*5.37%*	2.90%		*0.89%*	0.53%	
	10/2	TU9-N1	TM-23/TU-23		6 - 12	0.53	*6.10%*	3.70%		*0.94%*	0.68%	
	10/2	TU9-N2	TU-24	Single Dose; Tiller Positioned ~0.3' above Sediment Bed	0 - 3	0.43	*5.37%*	6.50%	1.13%	*0.89%*	1.70%	0.81%
	10/2	TU9-N2	TU-24		3 - 6	0.62	*5.37%*	4.50%		*0.89%*	1.00%	
	10/2	TU9-N2	TU-24		6 - 12	0.58	*6.10%*	5.60%		*0.94%*	0.90%	
	10/2	TU9-N3	TU-25	Single Dose; Tiller Positioned ~0.3' above Sediment Bed	0 - 3	0.34	*5.37%*	8.50%	3.13%	*0.89%*	2.20%	1.31%
	10/2	TU9-N3	TU-25		3 - 6	0.57	*5.37%*	5.10%		*0.89%*	0.82%	
	10/2	TU9-N3	TU-25		6 - 12	0.51	*6.10%*	5.20%		*0.94%*	0.86%	
Tine Sled Testing												
	9/27	TS1	TS-02	Single Dose	0 - 3	--	6.30%	5.80%	-0.50%	*0.89%*	0.89%	0.00%
	9/27	TS1	TS-02		3 - 6	--	5.90%	6.50%	0.60%	*0.89%*	0.83%	-0.06%
	9/27	TS1	TS-05	Single Dose	0 - 3	--	6.20%	7.90%	1.70%	*0.89%*	2.80%	1.91%
	9/27	TS1	TS-05		3 - 6	--	6.10%	6.00%	-0.10%	*0.89%*	1.10%	0.21%
	9/28	TS1	TS-05		0 - 6	0.38	6.15%	3.50%	-2.65%	*0.89%*	0.74%	-0.15%
	9/28	TS1	TS-05		6 - 12	0.46	*6.10%*	5.50%		*0.94%*	0.70%	
	9/28	TS1	TS-05		12 - 18	0.48	*6.30%*	6.40%		*1.10%*	1.00%	
	9/28	TS1	TS-05		18 - 22	0.47	*6.40%*	5.90%		*1.30%*	1.20%	
	9/27	TS2	TS-07	Double Dose	0 - 3	0.42	4.50%	5.31%	0.81%	*0.89%*	1.20%	0.31%
	9/27	TS2	TS-07		3 - 6	0.39	6.20%	5.31%	-0.89%	*0.89%*	0.79%	-0.10%
	9/27	TS1	TS-08	Single Dose	0 - 3	--	6.20%	5.60%	-0.60%	*0.89%*	1.80%	0.91%
	9/27	TS1	TS-08		3 - 6	--	4.90%	5.60%	0.70%	*0.89%*	0.77%	-0.12%
	9/27	TS1	TS-11	Single Dose	0 - 3	--	6.75%	6.50%	-0.25%	*0.89%*	0.89%	0.00%
	9/27	TS1	TS-11		3 - 6	--	5.10%	4.70%	-0.40%	*0.89%*	0.57%	-0.32%
	9/27	TS1	TS-14	Single Dose	0 - 3	--	6.50%	6.20%	-0.30%	*0.89%*	0.92%	0.03%
	9/27	TS1	TS-14		3 - 6	--	5.20%	4.90%	-0.30%	*0.89%*	0.73%	-0.16%
	10/2	TS3	TS-03	Single Dose	0 - 6	0.38	4.35%	6.70%	2.35%	*0.89%*	1.40%	0.51%
	10/2	TS3	TS-03		6 - 12	0.49	*6.10%*	6.90%		*0.94%*	0.98%	
	10/2	TS3	TS-03		12 - 18	0.48	*6.30%*	6.20%		*1.10%*	1.10%	
	10/2	TS3	TS-03		18 - 22	0.56	*6.40%*	6.70%		*1.30%*	1.50%	



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Activated Carbon Pilot Study, Grasse River, Massena, NY
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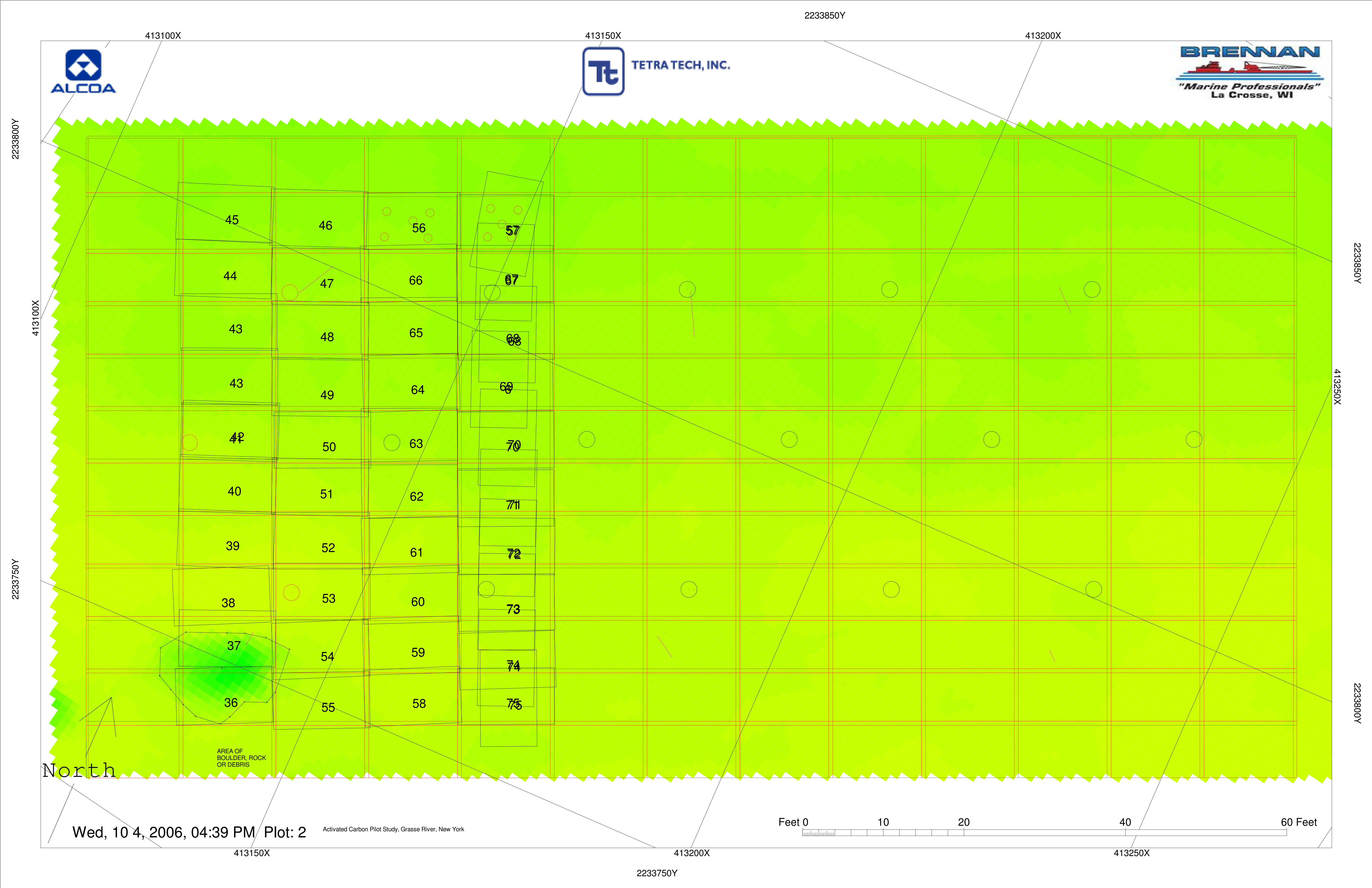

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AREA OF BOULDER, ROCK OR DEBRIS
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Activated Carbon Pilot Study, Grasse River, New York
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NO. 2 – CHANGE IN CARBON

Grasse River Activated Carbon Pilot Study
Engineering Change Notice

Change Number: 2 **Date:** October 12, 2006
Originator: Paul LaRosa

Change Notification: This Engineering Change Notice (No. 2) serves as notification to the USEPA by Alcoa of an alternate carbon specification for use in the "unmixed treatment area", as revised in Engineering Change Notice No. 1, approved by EPA on October 9, 2006.

Basis for Change: Initially, approximately 15,000 pounds of bituminous-based activated carbon (Carbsorb 50 x 200) was procured for the pilot study based on a target dose of 2.5% by weight in the top six inches of Grasse River sediment. This quantity included an additional project-wide 20% contingency. However, during carbon placement within the initial testing area and the mixed treatment area, carbon doses in excess of those expected were applied. Therefore, additional carbon is necessary to complete work in the unmixed treatment area. However, the material procured at the start of the project (bituminous-based Calgon Carbosrb 50 x 200) was manufactured specifically for the project and additional quantities of the exact same material is not readily available. Calgon was able to provide a near match of the original carbon material, with the only difference being that the additional material is a coconut shell-based carbon as opposed to the original bituminous-based carbon. The specifications for the coconut shell-based and bituminous-based carbon are attached. In addition, the attached memo provides and comparison of the characteristics of the bituminous-based and coconut shell-based carbon as evaluated by Dr. Upal Ghosh at UMBC based on a physical sample and information provided by Calgon.

Schedule Impact/Documents Affected: There are no anticipated impacts to the overall project schedule resulting from this change.

Grasse River Activated Carbon Pilot Study
Engineering Change Notice

Resolution: N/A

Level of Approval Required[1]: Notification only to USEPA ☐
Approval of USEPA Project Manager ☒
(with appropriate Agency review)

Approval/Acceptance (as necessary):

Alcoa Representative: Paul LaRosa (Anchor for Alcoa) Date: 10/12/06

Agency On-Site Representative: Dino J. Zack Date: 10/12/06

USEPA Project Manager: _____ Date: _____
(if necessary)

Distribution:

Young Chang, USEPA	Lawrence McShea, Alcoa
Dino Zack, USEPA Rep.	Heather VanDewalker, BBL
Dan Casey, BBL	Paul LaRosa, Anchor
Ray Mangrum, TtEC	James Quadrini, QEA
Clay Patmont, Anchor	Bruce Cook, Alcoa

1 Level of approval required will be based on type of change being requested. Minor adjustments (e.g., movement of sampling locations, times) will require Agency notification only and not approval. Significant changes will require Agency approval.

CALGON

CALGON CARBON CORPORATION

CERTIFICATE OF ANALYSIS

Media Type:	Carbsorb 50X200 (bituminous-based carbon)	**Date:**	26 September, 2006
		Lot Number:	W-24401
		Order Number:	
Customer:		**Customer PO Number:**	
		Customer Part Number:	

Test	Method	Test Result		
Iodine Number	BSC 90-032		1111	mg/g
Apparent Density	ASTM D-2854		0.39	g/cm^3
Moisture Content	ASTM D-2867		4	% w/w
Ash	ASTM 2866		9.5	% w/w
Particle Size Distribution	ASTM D-2862	US Series Screens		
		ON 50	0	% w/w
		50 X 80	65	% w/w
		80 X 100	15	% w/w
		100 X 200	20	% w/w
		THRU-200	0	% w/w

We hereby certify that the above data is correct as contained in the records of the company.
CALGON CARBON CORPORATION

Chuck Hegenberger

Chuck Hegenberger
Quality Assurance Supervisor

Calgon Carbon Corporation
835 North Cassady, Columbus, Ohio 43216 • Phone (614) 258-9501 • Fax (614) 258-3464
Email: jtennyson@calgoncarbon-us.com

CALGON CARBON CORPORATION

CERTIFICATE OF ANALYSIS

Media Type:	050X200-055C-CNS-V000 (Coconut-based Activated Carbon)	**Date:**	10 October 2006
		Lot Number:	P-21879
		CCC Order Number:	
Customer:		**Customer PO Number:**	
		Customer Part Number:	

Test	Method	Test Result		
CCl4	ASTM D-3467		60	% w/w
Ash Content	ASTM D-2866		3	% w/w
Moisture Content	ASTM D-2867		2	% w/w
Iodine	BSC 90-036		1196	mg/g
Apparent Density	ASTM D2854		0.47	g/cm^3
Particle Size Distribution	ASTM D-2862	US Series Screens		
		0n 50	0	% w/w
		50 x 80	28	% w/w
		80 x 100	26	% w/w
		100 x 200	44	% w/w
		Thru 200	2	% w/w

We hereby certify that the above data is correct as contained in the records of the company.

CALGON CARBON CORPORATION

Chuck Hegenberger

Chuck Hegenberger
Quality Assurance Supervisor

Calgon Carbon Corporation
835 North Cassady, Columbus, Ohio 43216 • Phone (614) 258-9501 • Fax (614) 258-3464
Email: jtennyson@calgoncarbon-us.com

In-Situ PCB Bioavailability Reduction in Grasse River Sediments
Grasse River Study Area, Massena, New York

Suitability of Coconut Shell Based GAC for Grasse River Application
October 2006

The following four characteristics were evaluated to estimate the suitability of the Coconut shell based carbon as a substitute for the bituminous-based Carbsorb carbon initially purchased for the project:

1. particle size range of carbon
2. specific surface area of the carbon
3. sorption property of the carbon
4. settling characteristics of the carbon

The coconut shell based carbon was suggested by Calgon for use in the Grasse River Activated Carbon Pilot Study due to the unavailability of additional Carbsorb 50x200 carbon in bulk quantities needed for application in the original "unmixed treatment area". Calgon considers the coconut shell based carbon to have similar sorption properties to the bituminous coal based Carbsorb carbon used in the initial testing area and mixed treatment area to date. The particle size range of the coconut shell carbon is identical to Carbsorb 50x200. The specific surface area reported by Calgon for the coconut shell based carbon is 1,000 m^2/g which is within the range of most activated carbons. The reported iodine number is 1,196 mg/g for the coconut shell carbon, which is slightly higher than that reported by Calgon for the bituminous-based carbon (1,111 mg/g) and that measured at UMBC for the TOG carbon from Calgon (iodine number of 870 mg/g) used in several laboratory studies examining PCB bioavailability reduction in sediments. UMBC performed a laboratory settling test with the coconut shell (50x200) carbon and the bituminous based Carbsorb (50x200) carbon. The two carbons (5g each) were heated in Grasse River water (200 ml) for 10 minutes close to boiling point and allowed to cool to room temperature. The heating quickens the process of "wetting" of the carbon to remove entrapped air. The samples were then mixed into a slurry and allowed to settle in a beaker. Attached are the pictures after 0-min, 1-min, and 10-minutes of settling. It appears that the coconut shell carbon settles faster than the Carbsorb carbon. Based on the preliminary settling tests shown below, the particle settling rate of the coconut-based carbon is estimated to be 0.25 to 0.33 foot per minute (fpm) compared to 0.05 to 0.1 fpm estimated for bituminous based carbon. A second test indicated that the coconut shell carbon wets rapidly even without heating. The observed increase in settling rate for the coconut shell based carbon is not expected to negatively impact the field application or performance.

Based on a review of available data, it appears that the coconut shell carbon should perform equally well from both a physical deployment and PCB absorption perspective in the intended application.

0 minutes after mixing

1 minute after mixing

10 minutes after mixing

NO. 3 – CHANGE IN BLACK CARBON ANALYTICAL METHOD

Change Number: 3
Originator: Paul LaRosa

Date: August 20, 2007

Change Notification: This Engineering Change Notice (No. 3) serves as notification to the USEPA by Alcoa of a change in analytical method used to measure the amount of activated carbon within the Grasse River sediments as part of the Activated Carbon Pilot Study (ACPS).

Basis for Change: See attached

Schedule Impact/Documents Affected: There are no anticipated impacts to the overall project schedule resulting from this change.

Resolution: N/A

Level of Approval Required[1]: Notification only to USEPA ☐
Approval of USEPA Project Manager (with appropriate Agency review) ☒

Approval/Acceptance (as necessary):

Alcoa Representative: Paul LaRosa Date: 8/20/07

Agency On-Site Representative: ______ Date: ______

USEPA Project Manager: (if necessary) ______ Date: 8/20/07

Distribution:

Young Chang, USEPA	Clay Patmont, Anchor
Lawrence McShea, Alcoa	Heather VanDewalker, ABBL
Bruce Cook, Alcoa	James Quadrini, QEA
Paul LaRosa, Anchor	Upal Ghosh, UMBC

1. Level of approval required will be based on type of change being requested. Minor adjustments (e.g., movement of sampling locations, times) will require Agency notification only and not approval. Significant changes will require Agency approval.

In-Situ PCB Bioavailability Reduction in Grasse River Sediments
Grasse River Study Area, Massena, New York
Revisions to Final Work Plan
June 4, 2007

This memorandum presents proposed revisions to the approved Final Work Plan (Work Plan) for the Activated Carbon Pilot Study (ACPS) of In-Situ PCB Bioavailability Reduction in Grasse River Sediments, Grasse River Study Area in Massena, New York (Alcoa 2006). Revisions to the Work Plan, as described herein, were necessitated based on a refined analytical method for measuring the amount of activated carbon applied to the Grasse River sediments that is more accurate and precise than methods available at the time the original ACPS Work Plan was developed.

During the design phase of the ACPS, the technical team developed a system to evaluate the activated carbon dose applied in the field that used a combination of total organic carbon (TOC) analysis (by Lloyd Kahn method) and "black carbon" analysis (a 375°C pre-combustion method [BC-T] refined by the University of Maryland Baltimore County [UMBC] based on anticipated activated carbon to be used in the project). In an effort to provide data supporting near real-time decision making, the technical team worked with Northeast Analytical, Inc. (NEA) to refine the BC-T method for a quick turn-around time (e.g., less than 24 hours). However, as construction proceeded, it was found that both the TOC and the BC-T methods did not provide the accuracy nor precision needed to evaluate the dose of activated carbon applied to the sediments. Note that the TOC measurements (including the three method average delta) were used as the primary metric during construction to support field decisions.

Several laboratory investigations, including matrix spikes and inter-laboratory comparisons, were performed to investigate the issues identified with the black carbon (BC-T) analysis. Through these investigations, it was determined that the lower than expected values of activated carbon in post-activated carbon application sediment samples and low recovery in matrix spike experiments were not due to differences in laboratory implementation, but rather due to the difficulty involved in measuring activated carbon through the black carbon (BC-T) analysis. The autoignition point of the bituminous-based activated carbon used in the Initial Testing and Mixed Tiller Treatment Areas is about 450°C, whereas that of the coconut shell-based activated carbon used in the Tine Sled Mixed and Tiller Unmixed Treatment Areas is between 275 and 325°C. Laboratory matrix spike analyses indicate that the pure bituminous-based activated carbon gives good recovery in the range of 80 percent, but when amended to wet sediments, the recovery is lower. When activated carbon has natural organic matter adsorbed to it, the autoignition point can be lowered because the natural organic matter can ignite the carbon at a lower temperature. There is also a potential change in ignition behavior of activated carbon upon acid neutralization ("acid washing"); residual salt in the activated carbon after acid neutralization can lower the autoignition point. These phenomena can potentially explain why a lower recovery of the coconut shell-based activated carbon was observed compared to the bituminous-based activated carbon, and the acid washed activated carbon compared to the unwashed activated carbon.

Subsequent to completion of the 2006 field implementation activities and in light of the aforementioned recovery challenges, UMBC refined and improved a black carbon-chemical pre-oxidation (BC-C) method (see attachment to this ECN), resulting in a more accurate and precise procedure to measure activated carbon concentrations in Grasse River sediments, relative to the TOC and BC-T methods utilized during 2006 field implementation. Based on the increased accuracy and precision of the BC-C methodology, this technique was used to analyze archived aliquots of samples originally tested using the standard TOC and/or BC-T techniques during field implementation. In addition, this BC-C technique will be used to perform activated carbon measurements on all future sediment samples collected as part of the ACPS long-term monitoring program.

ATTACHMENT
Assessment of Activated Carbon in Pre- and Post-- Treatment Sediment Samples from Grasse River

ASSESSMENT OF ACTIVATED CARBON IN PRE- AND POST-TREATMENT SEDIMENT SAMPLES FROM GRASSE RIVER

Adam Grossman and Upal Ghosh
Department of Civil and Environmental Engineering
University of Maryland Baltimore County

March 2007

BACKGROUND

This research was conducted to measure the dose of activated carbon (AC) achieved in sediments after the Activated Carbon Pilot Study (ACPS) in Grasse River. Based on prior laboratory studies, the target dose of AC to achieve reduction of PCB bioavailability in surficial sediments was 2.5% by dry weight. A direct measurement of AC in post treatment sediment core samples was sought to evaluate the actual dose of AC achieved in the treatment plots using different application modes. As described in section 3.3.2. of the ACPS Construction Documentation Report, two qualitative visual methods and two quantitative analytical methods were used initially to evaluate the amount of AC in sediments after treatment. The qualitative methods involved removal of clays from the sediment samples by washing or sieving followed by visual observation of the presence of AC. The quantitative methods involved evaluating the differences in sediment total organic carbon (TOC) or black carbon (BC) in pre- and post-treatment sediment core samples. The natural variability of sediment TOC (4-7%) made it difficult to quantify the achieved dose of AC based solely on TOC difference in cores samples from the same locations before and after application. The BC analysis based on low temperature (375 ^{o}C) pre-combustion of natural organic matter was expected to aid in the analysis by removing the interference of the variable natural organic matter content. However, during the progress of the BC measurements it was realized that some AC was being oxidized along with natural organic matter at 375^{o}C. The ACPS Final Report therefore uses a weight of evidence approach to make the best interpretation possible using the TOC data. The approach (named 'three method average') was designed to reduce the uncertainty from natural organic matter variability and involved estimating a more representative pre-treatment TOC value in sediment cores by averaging the pre-application TOC value at that site, the average pre-application surface sediment TOC value, and the post application TOC value of the 3-6" interval at that site.

In this research the BC measurement method was explored further to develop an alternative approach to assess AC in sediments and reduce the variability from background natural organic matter. Past research has not produced a definitive method for measuring black carbon. As described in Nguyen et al. (2004), there are four broad categories of black carbon assessment methods: 1) microscopic examination, 2) thermal/optical measurement, 3) chemical oxidation, and 4) chemothermal oxidation. Each method has its unique advantages and disadvantages. The chemothermal method adopted in the initial assessment utilizes a low temperature (375 ^{o}C) pre-combustion to burn off a major portion of the natural organic carbon while preserving most of the black carbon (or elemental carbon) in the sample (Gustaffson et al., 1997). The chemothermal oxidation method was not designed for measuring activated carbon. Jonkers and Koelmans (2002) reported that activated carbon showed 31% black carbon by this method.

Therefore the chemothermal method was modified at UMBC to reduce the oxidation of activated carbon and enable the assessment of sediment amended with activated carbon. Figure 1 shows the results of studies at UMBC demonstrating the progressive burnoff of natural organic carbon and activated carbon (Clagon TOG) with increasing temperature. Based on these results it appeared that pre-combustion of the sediment sample at 375 ^{o}C for four hours can reduce the background natural carbon to 1% (nearly 80% reduction) without significantly affecting the activated carbon. At 400 ^{o}C, most of the activated carbon is also burnt off. When the same pre-combustion conditions were applied to the two types of AC used in the Grasse River field application (Carbsorb and coconut shell based AC), results showed that both natural organic carbon and AC were oxidized. Figure 2 shows the results of four hour pre-combustion at 375 ^{o}C of Grasse River sediments spiked with different amounts of Carbsorb AC (50 – 200 mesh). As shown in Figure 2, there was little difference in carbon measured between the blank and any of the spiked sediment samples. This indicated that natural organic carbon as well as the added AC was being oxidized. When the Carbsorb or coconut shell AC was pre-combusted by itself for four hours at 375 ºC, it was not significantly affected and most of the carbon remained. However, when mixed with the sediment, both the Carbsorb and coconut shell AC was oxidized at 375 ºC. It is hypothesized that in the presence of sediment, natural organic carbon adsorbs to the surface of the AC and can act as a catalyst to lower the ignition temperature of the AC, causing it to burn off at 375 ^{o}C. This hypothesis is being examined further through additional experiments at UMBC. Experiments using numerous combinations of time and temperature were performed, but recoveries of the Carbsorb and coconut shell AC were insufficient by the thermal oxidation technique. After failing to achieve high enough recovery of the Carbsorb and coconut shell AC while removing the natural organic carbon using thermal oxidation, a different approach using wet chemical oxidation was pursued.

In the wet chemical oxidation method, a strong oxidizing agent such as H_2O_2 or $Cr_2O_7^{-2}$ is used to oxidize the natural organic matter while retaining the black carbon. Black carbon forms are known to be resistant to chemical oxidation. The wet chemical oxidation is followed by a high temperature (900 ^{o}C) oxidation to measure the remaining black carbon as CO_2. Below is a description of the chemical oxidation technique used in this study to isolate and quantify AC in a sediment matrix.

DESCRIPTION OF THE WET CHEMICAL OXIDATION METHOD

The wet chemical oxidation method uses a sulfuric acid/potassium dichromate solution to oxidize most of the natural organic carbon in river sediments while preserving the majority of the activated carbon added to the sample. This method was based on earlier work performed by Bird and Grocke (1997) and was modified at UMBC for use in the measurement of activated carbon in Grasse River sediment samples.

Acid Solution Preparation

A volume of concentrated sulfuric acid was measured into a glass bottle. $K_2Cr_2O_7$ was added to the measured acid to produce a 0.1 M solution. The solution was stirred with a magnetic stirrer for one hour. While the solution was being stirred, a vortex was seen at the surface of the liquid. When finished stirring, the solution was very viscous as well as dark orange in color. No specks of $K_2Cr_2O_7$ were visible in the solution after stirring. Prior to each use, the solution was stirred for at least 10 minutes to ensure that any precipitated solids were dissolved back into solution.

Sample Preparation: Wet and Dry Sediment
Samples for black carbon analysis that are reacted wet require a moisture content analysis. The sample was well mixed before measurement. Between 5 and 10 grams of the sediment was measured into an evaporating dish of a known weight. The sample was dried for at least 2 hours at 110 °C. The dried sample was then reweighed and the percent moisture content calculated. After calculating the percent moisture content, the amount of wet sediment equivalent to 200mg +/- 10 mg dry sediment was weighed on a balance sensitive to the ten thousandth of a gram. The wet sediment was then carefully transferred from the dish to a chemical oxygen demand (COD) test tube with the aid of a squirt bottle filled with DI water. The test tube was capped, centrifuged, and the overlying water decanted or pipetted making sure that no floating particles were lost. For samples that were reacted with the acid dry, 200 mg +/- 10 mg were weighed out in a metal weighing dish on a balance sensitive to the ten thousandth of a gram. Again, the samples were well mixed before measurement. A metal weighing dish was used to reduce static interaction between the dish and sediment. After the sediment was weighed, it was carefully transferred using a metal spatula from the dish to a COD test tube and capped.

Acid Addition to Wet and Dry Sediment
Due to the high viscosity of the acid solution, acid additions to sediment were not performed using a pipette. All acid additions to the sediment were made by pouring from a graduated cylinder into the COD test tubes. For both the wet and dry sediment, 5 mL of the acid solution was added to the test tube. For the wet sediment, a violent exothermic reaction takes place at approximately 1 minute after acid addition. The test tubes are loosely capped to allow gases to escape during the reaction. After the reaction, the caps were tightened. The test tubes with dry sediments were shaken to thoroughly mix the acid solution and sediment.

Acid Reaction in a Water Bath
After adding the acid to the sediments, the COD tubes were placed in a hot water bath set at 60 °C +/-1 °C. The sediment samples were allowed to react with the acid in the water bath for one hour with the caps loose to allow any gases to escape. The one-hour reaction period was broken down into two half-hour steps. After the first half-hour step, the COD tubes were removed from the water bath and centrifuged to settle the solids. The supernatant was decanted and 5 mL of fresh acid solution added to the COD tubes. After the acid was replaced, the tubes were placed back in the hot water bath for the second half-hour step. After reacting for a total of 1 hour in the hot water bath, the samples were centrifuged and the supernatant decanted.

Removal of Excess Acid Solution
After decanting the overlying acid, the remaining acid in the sample was removed with two methanol rinses. Methanol rinses were performed by filling each COD tube with 3 to 5 mL of methanol. The COD tubes were shaken to thoroughly mix the sediment and methanol. After shaking, the caps were loosened to allow gases to escape. The caps were then retightened and the COD tubes were centrifuged and the supernatant decanted. This rinsing procedure was performed a second time. The final supernatant was clear and colorless.

Sample Transfer to Combustion Boat
Once the excess acid was removed, the samples were ready to be transferred into combustion boats made of alumina ceramic. COD tubes were filled with approximately 0.5 mL of methanol. The sample was stirred and pipetted using a disposable glass transfer pipette into the combustion boats. Any sample remaining in the COD tube after the first transfer was removed using a second transfer performed in the same manner. Once all transfers were complete, the samples boats were put in a drying oven in a fume hood for at least one hour at 110 °C to remove methanol.

Sediment TOC Measurement
The Total Organic Carbon (TOC) analysis was performed using a Shimadzu TOC analyzer with a solids sample module (TOC-5000A and SSM-5000A). Carbon in the sample was combusted to form CO_2, which was detected by a non-dispersive infrared gas analyzer (NDIR). The sediment TOC analysis followed an operating procedure recommended by the manufacturer. The prepared sample in a ceramic combustion boat was inserted in a 900 ^oC combustion furnace. The high temperature and pure oxygen environment, in conjunction with a platinum catalyst, provided complete oxidation of carbon compounds into CO_2 gas and water. The produced CO_2 gas was detected by a NDIR detector. The total organic carbon concentration was determined by generating a calibration curve with known standards and comparing area counts of the unknown sample to that of the best-fit line in the calibration curve.

Instrument TOC calibration
The instrument was calibrated using a carbon-source standard (e.g., reagent-grade glucose or naphthalene). A series of calibration curves that accommodate the expected working ranges of the samples were generated as per instrument manufacturer's recommended procedures. The generally accepted measurement range for most carbon analyzers is from 0.1 mg to 30 mg of carbon in a solid sample; maximum sample size is limited to 1.0 g. For TOC analysis in sediment samples, this instrument's minimum detection limit for carbon, based on a 200 mg dried sample and a lowest calibration point of 0.1mg C, is 0.05%. If lower detection limits are required, sample amount can be increased up to 1000 mg.

Appropriate QA/QC samples were analyzed along with each batch of ten sediment samples to include: 1) Background blank, 2) Blind duplicate sample, and 3) Carbon QC-check sample. The acceptance criteria were as follows: ± 20 % relative percent difference (RPD) for duplicate analysis; and percent recovery of carbon from QC-check sample, 90-110%. The background blank sample should not give a value higher than the stated minimum detection limit of 0.1 mg carbon. If a batch run did not meet the above quality standards, the analysis of all samples within the failed batch were repeated until the run was in full compliance with the QC requirements.

RESULTS

Results of AC calibration. AC was added to Grasse River sediment in the laboratory to prepare a range of calibration standards of sediment containing AC. Percent AC added was calculated based on the dry weight of sediment. Figures 3 and 4 shows the calibration results of the chemical oxidation method for Grasse River sediment with 0%, 1%, 2.5%, and 5% AC added.

Sediment without any AC addition shows very low TOC measurement (<0.1%) after the chemical oxidation process. Thus most of the background natural organic matter in Grasse River sediments is oxidized by the wet chemical oxidation pretreatment. There is a linear relationship between AC dose in sediment and TOC measured after the wet chemical oxidation. The residual TOC remaining after chemical oxidation (defined as black carbon) is 80% for Carbsorb AC and 87% for coconut shell AC. The calibration plots shown in Figures 3 and 4 were used to calculate the dose of AC in sediment samples obtained from the field.

Results of field sample analysis. The wet chemical oxidation technique turns the color of Grasse River sediment to light grey as shown in Figure 5. Most of the vegetative debris and detritus are oxidized during the chemical oxidation process. The unreacted AC preserved through the chemical oxidation process is nicely visible under a light microscope. Also shown in Figure 5, samples with elevated AC assessment clearly demonstrate the high abundance of activated carbon particles observed visually. Bleaching of the natural sediment particles in the chemical oxidation process enhances the visibility of the AC particles.

Pre-application samples

The pre-application core samples analyzed at UMBC were not collected from the exact same locations as the samples collected immediately after application of AC. There were nine sampling locations from the three treatment areas as illustrated in Figure 2-7 in the ACPS Final Report. Results of the AC analysis of pretreatment core samples from the treatment areas are shown in Figure 6. The average AC measurement in the top 0-6 inches over the entire treatment area was 0.1% with a low standard deviation of 0.04%. The results demonstrate that the wet chemical oxidation technique is effective in removing the background interference from natural organic matter present in the sediment.

Mixed Tiller Treatment Area samples

Samples analyzed from the Mixed Tiller Treatment Area (MTA) were either single-point cores or composite samples made up of five separate cores collected from a 3x3 ft sampling grid as described in section 3.3.4 in the ACPS report. Twenty single-point core samples were analyzed at three depth intervals each (0-3", 3-6", and 6-12'). The ten composite samples were analyzed at two depth intervals each (0-3" and 3-6"). The average AC value for the top three inches of sediment in the MTA area was 3.00% with a standard deviation of 2.46% based on both single-point and composite core analysis. Although the average dose of AC achieved was above the target of 2.5%, there was variability across the treatment area as illustrated in Figure 7. The measured values ranged from near background to about 10% AC. Nearly 90% of the samples received a dose of AC more than 1% and nearly half of the samples received a dose of 2% or higher. The ten composite core samples gave an average of 3.85% AC (SD = 1.53%) in the top 3 inches of sediment, whereas, the 20 single point core samples gave an average of 2.58% AC (SD = 2.75%) in the top 3 inches of sediment. Sediment core samples below 3" barely showed any presence of AC. Except for a couple of sample locations, all AC values for 3-6" depths and 6-12" depths were close to the pretreatment background measurements.

Tine Sled Unmixed Treatment Area samples

A total of 9 composite sediment core samples were analyzed for the Tine Sled Unmixed Treatment Area (TSUTA). All but one composite core samples were analyzed at sediment depth intervals of 0-3” and 3-6”. The average AC measured for the top three inches of sediment was 2.97% with a standard deviation of 1.82%. However, it should be noted that one of the samples from the TSUTA (TSUTA-8) was collected outside of the treatment area. Excluding TSUTA-8, the average AC measured in the top three inches of sediment was 3.34%. As shown in Figure 8, two thirds of the samples analyzed in TSUTA received a dose of AC greater that the target dose of 2.5%. Except for one location, none of the samples in this region had AC in the 3-6” depth.

Unmixed Tiller Treatment Area samples
A total of 8 composite sediment core samples were analyzed in the Unmixed Tiller Treatment Area (UTA) and are presented in Figure 9. All 8 composite core samples were analyzed at depths of 0-3” and 3-6”. The average AC measured for the top three inches of sediment was 5.43% with a standard deviation of 3.58%. Among the three treatment areas, this area achieved the highest average dose of carbon based on the composite core samples analyzed. Nearly 60% of the treatment area received a dose of AC greater than the target dose of 2.5%. As seen in the other two treatment areas, there was no AC measured in the core samples at 3-6” depth.

Initial Testing Area samples
A total of 9 single point sediment samples were analyzed from the Initial Testing Area (Tiller Mixed and Tiller Unmixed samples) and are presented in Figure 10. All 9 single point samples were analyzed at the 0-3” depth. The average AC measured in this initial testing area was the lowest at 1.64% with a standard deviation of 1.06%.

QC samples
Quality control samples were analyzed throughout the 3-month period of analysis of the field sediment samples. Background blank samples consisting of empty combustion boats were analyzed periodically over the analysis period. The measured TOC values from blank combustion boats were consistently below the minimum detection limit of 0.1 mg carbon. The quality control samples also included blank Grasse River sediment and Grasse River sediment amended with 2.5% AC (both Carbsorb and coconut shell AC). As shown in Figure 11, the blank Grasse River sediment gave a consistently low AC measurement (0.07% ± 0.02). Grasse River sediment amended with both carbon types gave consistent AC measurements throughout the analysis period (2.49% ± 0.12 for Carbsorb AC and 2.54% ± 0.09 for coconut shell AC). Many of the field samples were split at UMBC and analyzed in duplicate. The duplicate measurements are very close as seen in Figure 12 and span a large range of AC values from zero to seven percent.

REFERENCES

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Cornelissen, G.; Gustafsson, O.; Bucheli, T.D.; Jonker, M.T.O.; Koelmans, A.A.; Van Noort, P.C.M. Extensive Sorption of Organic Compounds to Black Carbon, Coal, and Kerogen in Sediments and Soils: Mechanisms and Consequences for Distribution, Bioaccumulation, and Biodegradation. *Environ. Sci. Technol*. 2005, vol. 39, 6881 – 6890.

Gustafsson, O.; Haghseta, F.; Chan, C.; Macfarlane, J.; and Gschwend, P.M. Quantification of the Dilute Sedimentary Soot Phase: Implications for PAH Speciation and Bioavailability. *Environ. Sci. Technol*. 1997, 31, 203-209.

Nguyen, T.H., Brown, R.A. and Ball, W.P. An Evaluation of Thermal Resistance as a Measure of Black Carbon Content in Diesel Soot, Wood Char, and Sediment. *Organic Geochemstry*. 2004, 35, 217-234.

Jonker, M.T.O. and Kolemans, A.A. Sorption of Polycyclic Aromatic Hydrocarbons and Polychlorinated Biphenyls to Soot and Soot-Like Materials in the Aqueous Environment: Mechanistic Considerations. *Environ. Sci. Technol*. 2002, 36, 3725-3734.

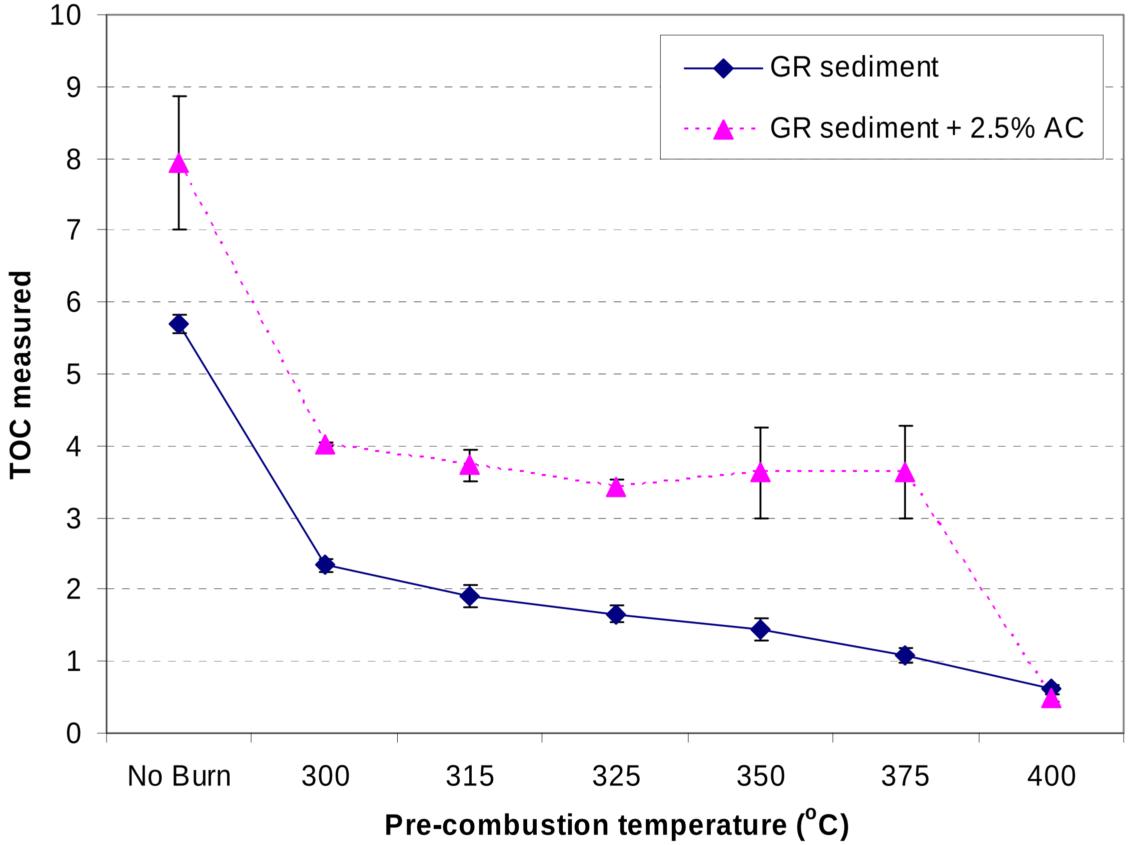


Figure 1. Effect of different precombustion temperatures (for 4 hours) on the measurement of total organic carbon in Grasse River sediment mixed with 2.5% AC. The carbon used was Calgon TOG 50-200 mesh.

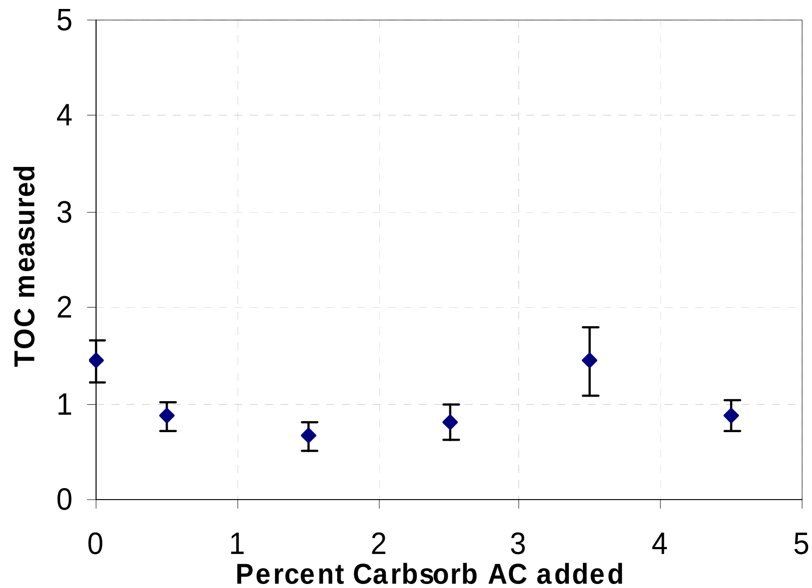


Figure 2: Percent Carbsorb AC measured after sediment was combusted for 4 hours at 375ºC

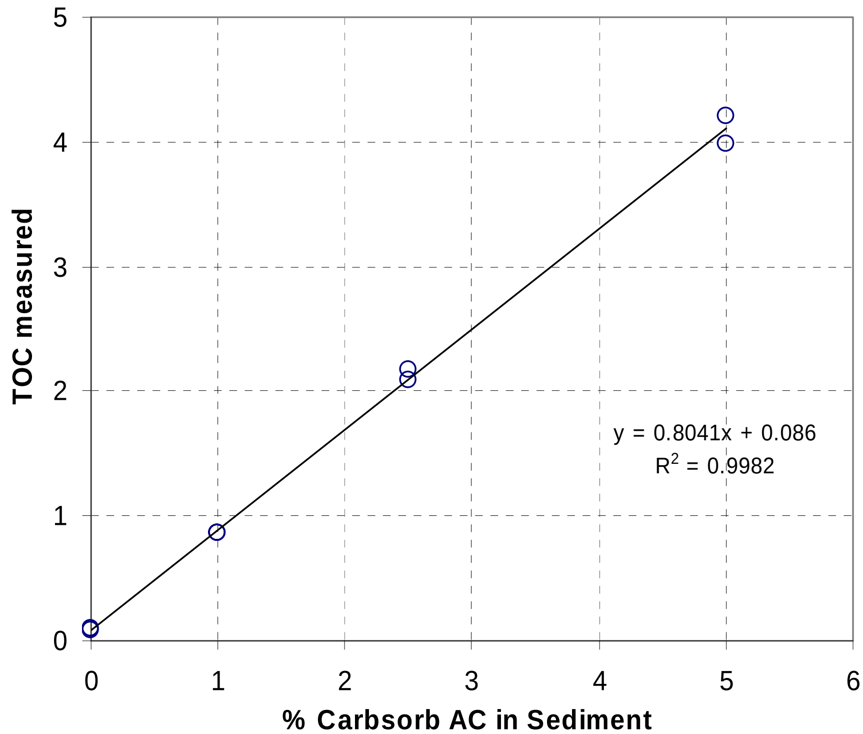


Figure 3. TOC measured after chemical oxidation pretreatment of Grasse River sediment amended with different doses of Carbsorb activated carbon.

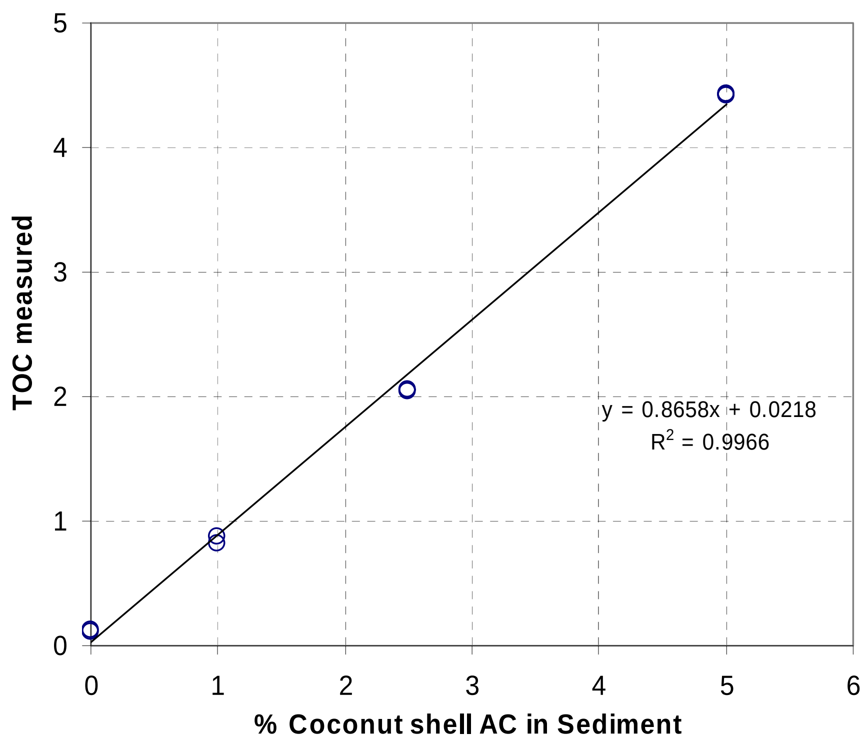


Figure 4. TOC measured after chemical oxidation pretreatment of Grasse River sediment amended with different doses of coconut shell activated carbon.

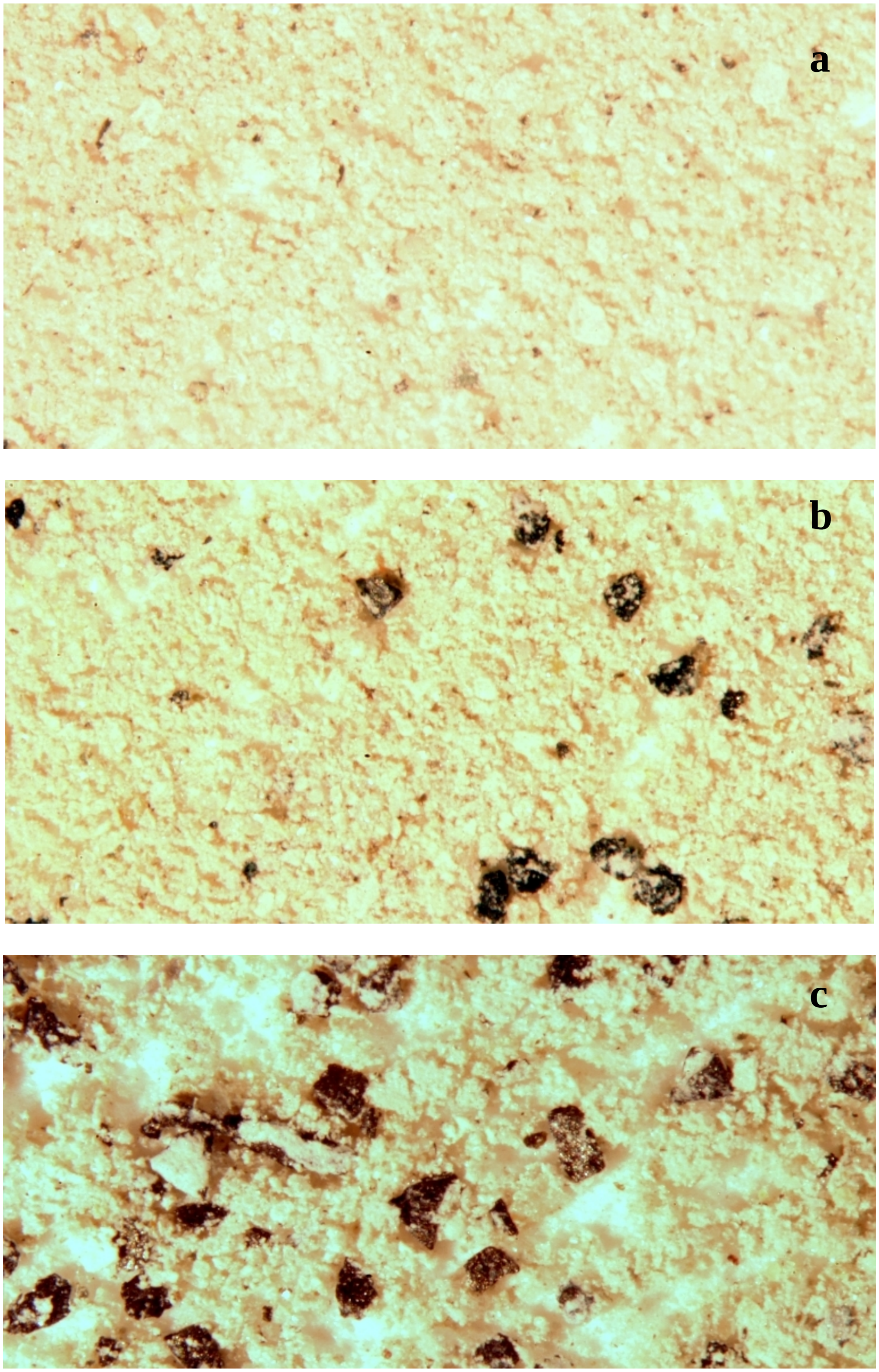


Figure 5. Microscopy images of sediment core samples after chemical oxidation showing a) sample with no activated carbon (MTA 24 3-6"); b) sample with low activated carbon (MTA 24 0-3"); and c) sample with high activated carbon (MTA 18D 0-3").

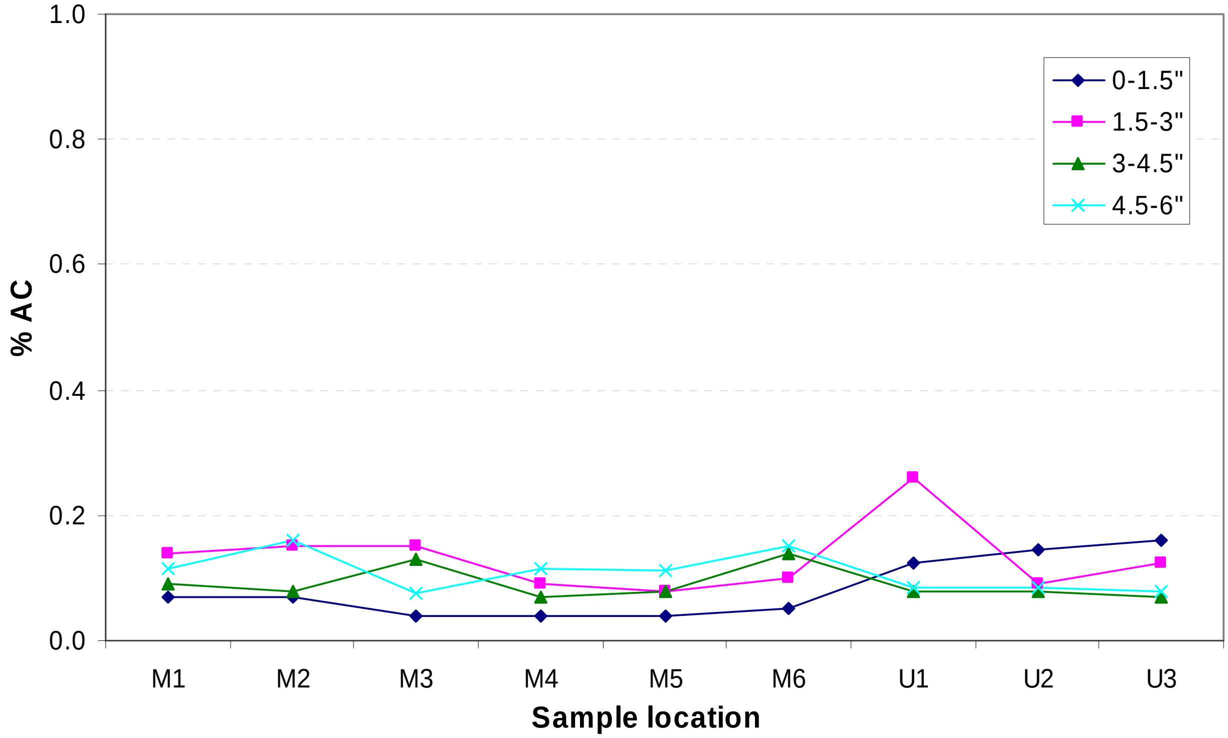


Figure 6. AC measured by wet chemical oxidation technique for the different sample locations in the Treatment Areas before AC application (single-point core samples). Average AC = 0.1% (SD = 0.04)

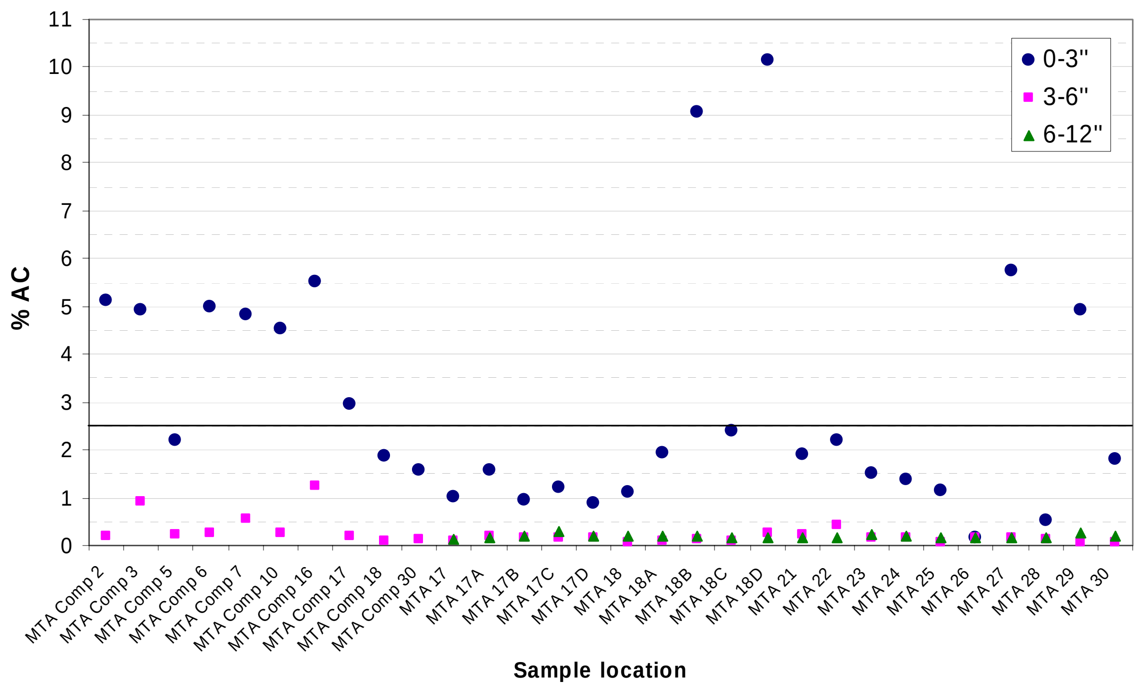


Figure 7. AC measured by wet chemical oxidation technique for the different sample locations in the Mixed Tiller Treatment Area (includes single-point and 5-point composite core samples). Average AC = 3.00% (SD = 2.46)

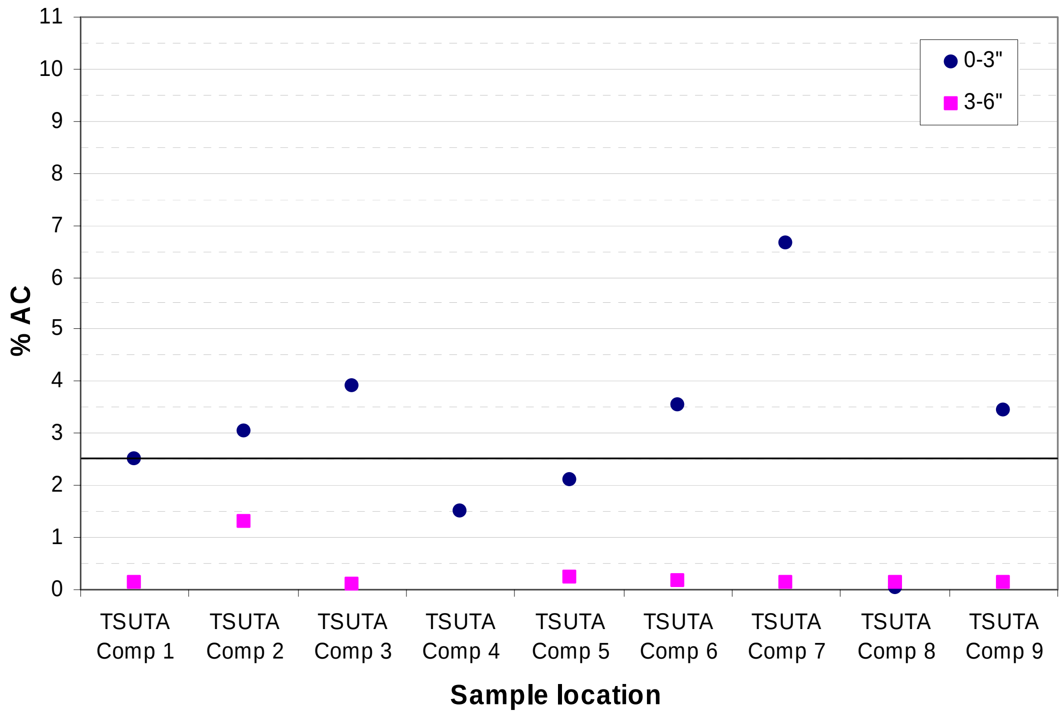


Figure 8. AC measured by wet chemical oxidation technique for the different sample locations in the Tine Sled Unmixed Treatment Area (5-point composite core samples). Average AC in 0-3" = 2.97% (SD = 1.82)

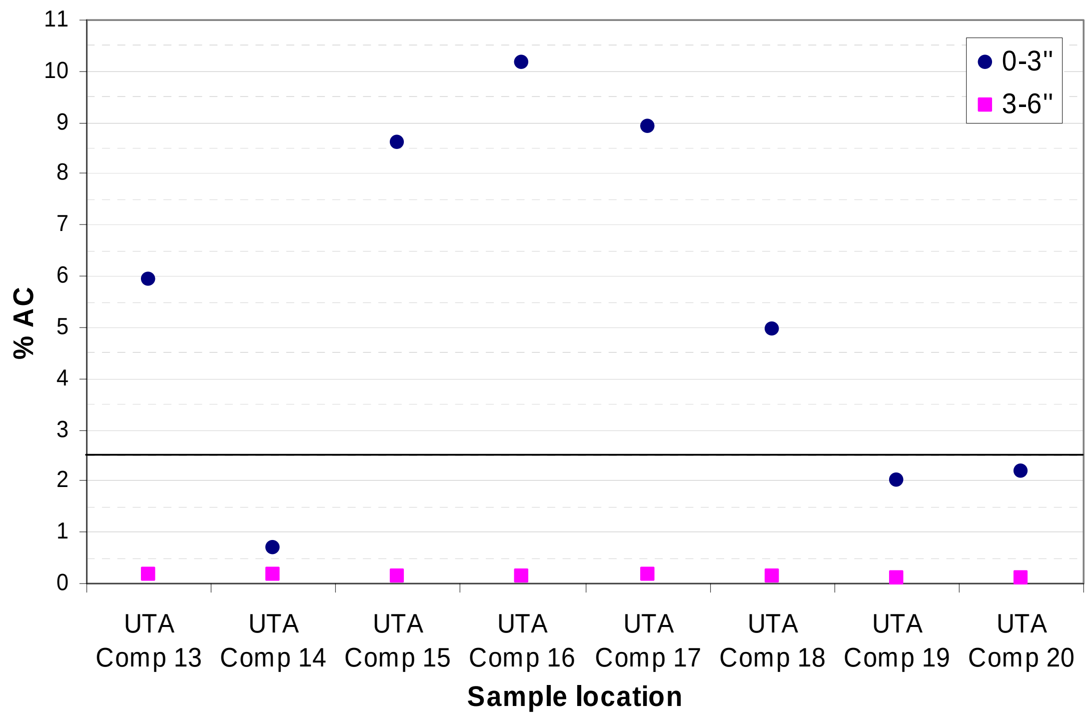


Figure 9. AC measured by wet chemical oxidation technique for the different sample locations in the Unmixed Tiller Treatment Area (5-point composite core samples). Average AC in 0-3" = 5.43% (SD = 3.58)

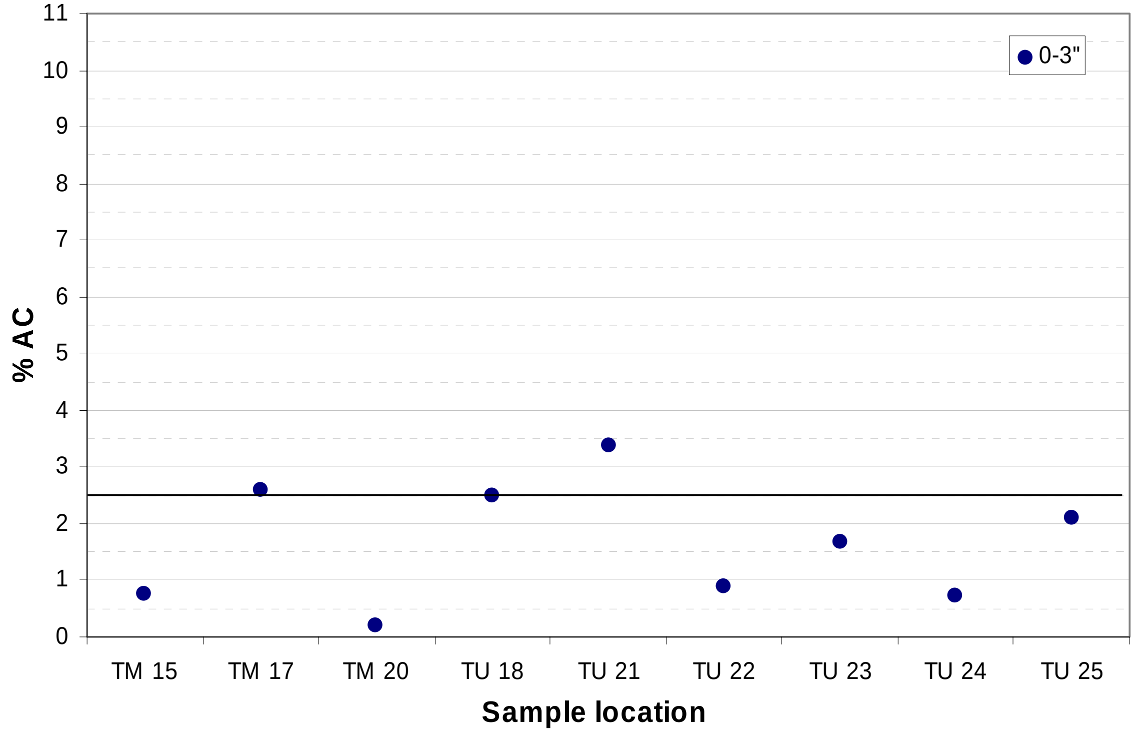


Figure 10. AC measured by wet chemical oxidation technique for the different sample locations in the Initial Testing Area (single-point core samples). Average AC = 1.64% (SD = 1.06)

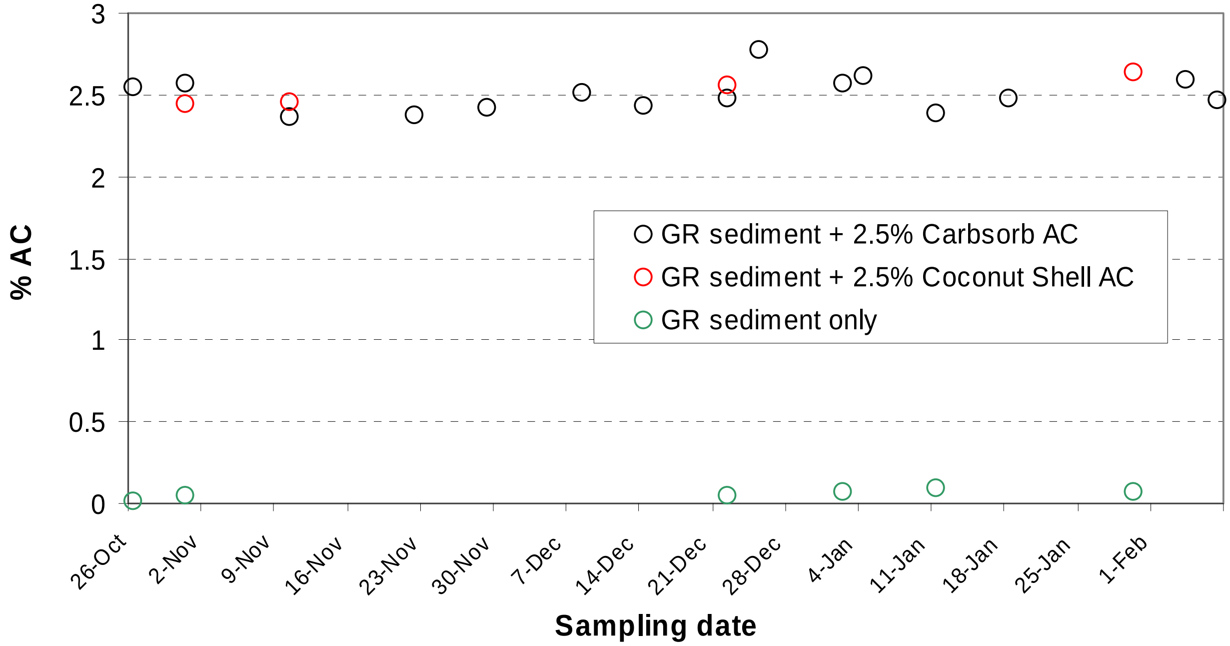


Figure 11. Analysis of blank Grasse River sediment and quality control check samples (Grasse River sediments + 2.5% AC) analyzed through the 3-month period of sample analysis.

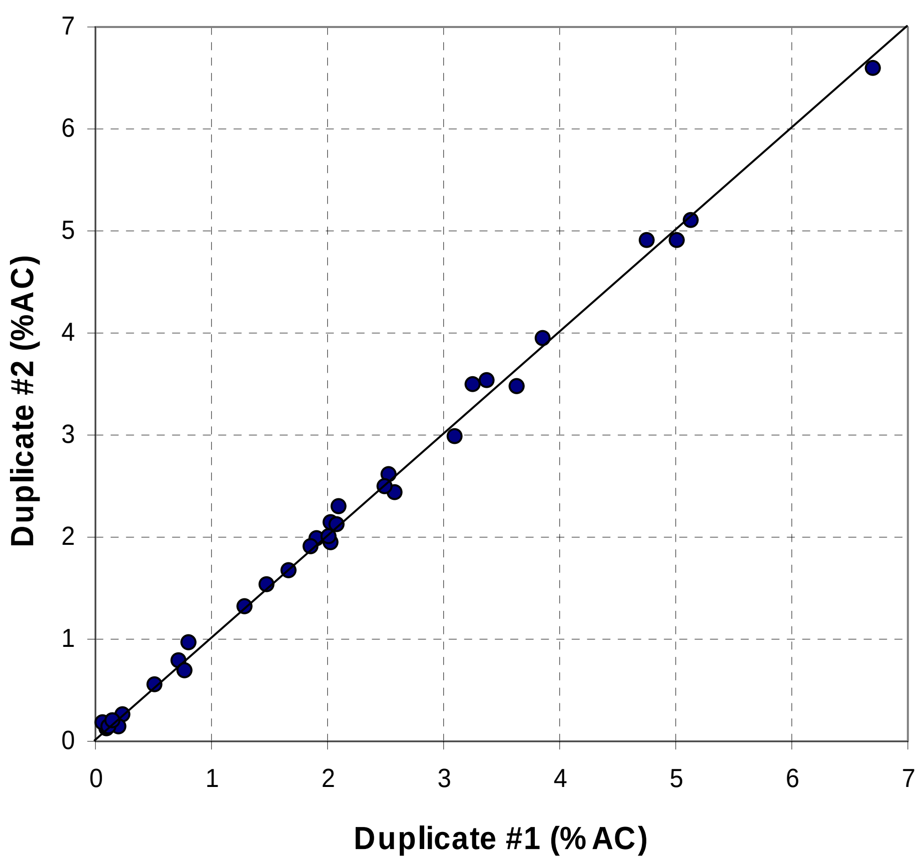


Figure 12. Analysis of duplicate samples split at UMBC.

NO. 4 – CHANGE IN SCOPE OF THE LONG-TERM MONITORING PLAN

Change Number: 4
Originator: Paul LaRosa

Date: August 20, 2007

Change Notification: This Engineering Change Notice (No. 4) serves as notification to the USEPA by Alcoa of a change in the scope of the long-term monitoring plan for the Grasse River Activated Carbon Pilot Study (ACPS).

Basis for Change: See attached

Schedule Impact/Documents Affected: There are no anticipated impacts to the overall project schedule resulting from this change.

Resolution: N/A

Level of Approval Required[1]: Notification only to USEPA ☐
Approval of USEPA Project Manager (with appropriate Agency review) ☒

Approval/Acceptance (as necessary):

Alcoa Representative: Paul LaRosa Date: 8/20/07

Agency On-Site Representative: ______ Date: ______

USEPA Project Manager: (if necessary) [signature] Date: 8/20/07

Distribution: Young Chang, USEPA
Lawrence McShea, Alcoa
Bruce Cook, Alcoa
Paul LaRosa, Anchor
Clay Patmont, Anchor
Heather VanDewalker, ABBL
James Quadrini, QEA
Upal Ghosh, UMBC

1 Level of approval required will be based on type of change being requested. Minor adjustments (e.g., movement of sampling locations, times) will require Agency notification only and not approval. Significant changes will require Agency approval.

In-Situ PCB Bioavailability Reduction in Grasse River Sediments
Grasse River Study Area, Massena, New York
Revisions to Final Work Plan
August 20, 2007

This memorandum presents proposed revisions to the approved Final Work Plan (Work Plan) for the Activated Carbon Pilot Study (ACPS) of In-Situ PCB Bioavailability Reduction in Grasse River Sediments, Grasse River Study Area in Massena, New York (Alcoa 2006). Revisions to the Work Plan, as described herein, were necessitated based on the redistribution of the activated carbon treatment areas, as described in Engineering Change Notice (ECN) No. 1, approved by the USEPA.

Based on the results from the Initial Testing Area, both the tiller and tine sled units were carried forward for testing in the larger-scale pilot application, as described in ECN No. 1. This necessitated a change in the study design footprint presented in the original Work Plan (Alcoa 2006). Specifically, the Unmixed Treatment Area, which originally measured 50 feet by 100 feet, was divided into two sub-areas. The upstream sub-area, measuring 50 feet by 60 feet, was designated for "mixed" application using the tine sled. The downstream sub-area, measuring 50 feet by 50 feet, remained as an Unmixed Treatment Area (using the tiller device without engaging the tiller).

In order to facilitate evaluation of these treatment areas as part of the long-term monitoring program, sediment samples were collected from three locations within each of the Tine Sled Mixed Treatment Area and the Unmixed Tiller Treatment Area (see attached Figure 1) prior to activated carbon application, for a total of six samples. These samples were submitted for baseline ex situ biological analysis at the University of Maryland Baltimore County (UMBC), consistent with the analysis program for the six baseline monitoring locations originally planned within the Mixed Tiller Treatment Area. However, given the timing of the field implementation, it was not feasible to conduct baseline in situ biological studies at the monitoring locations within the Tine Sled and Unmixed Tiller Treatment Areas.

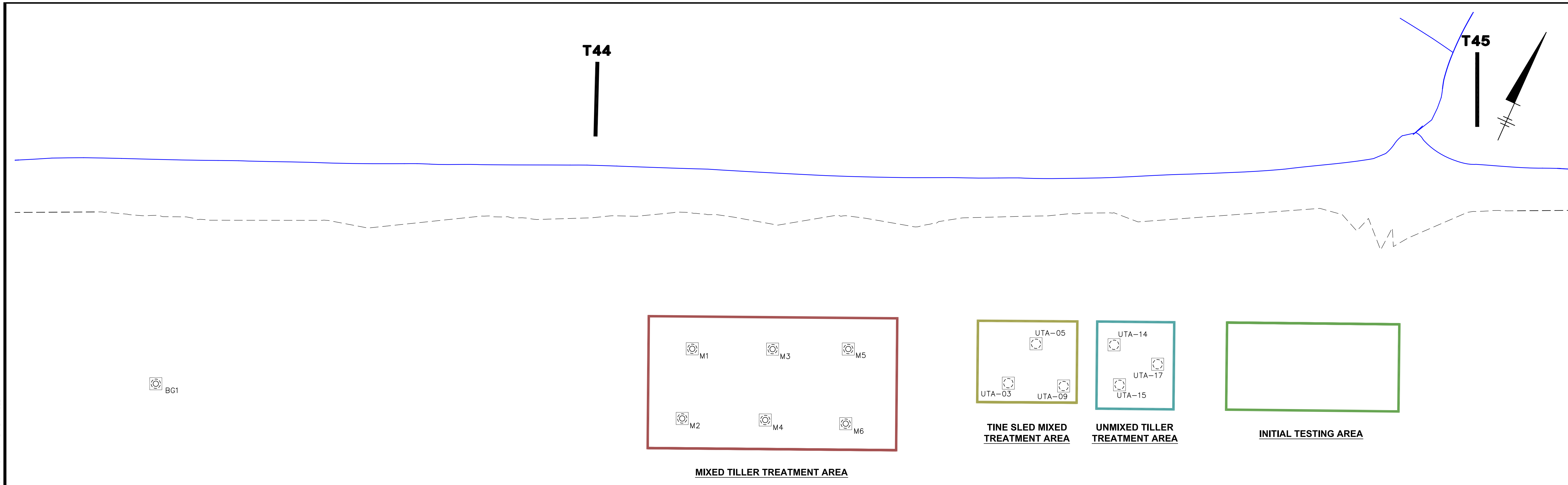
This memorandum documents the proposed augmentation of the ACPS long-term monitoring program to include the six additional sampling locations within the Tine Sled Mixed and Unmixed Tiller Treatment Areas for ex situ biological testing and benthic community studies to provide further information on the relative performance of the different application methods. In addition, the ACPS long-term monitoring plan will include collection of two sediment samples downstream of the study area to assess potential transport of activated carbon from the treatment areas (see Figure 2 for sample locations). Furthermore, a modification to the plan for sediment sampling and activated carbon testing is proposed that incorporates the use of a refined analytical testing method (see ECN No. 3) on 5-point composite samples in each of the three treatment areas (see attached Figure 2). The enhanced monitoring scope incorporating the original Unmixed Treatment Area, as defined in the Work Plan (Alcoa 2006) is provided in the table below and sampling locations illustrated on the attached Figures.

Expansion of Monitoring Scope to Incorporate the Additional Testing in the Original Unmixed Treatment Area

Monitoring Method	Original Long-Term Monitoring Scope	Enhanced Long-Term Monitoring Scope
Ex situ PCB biouptake	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope plus 3 additional samples in the Tine Sled Mixed Treatment Area and 3 additional samples in the Unmixed Tiller Treatment Area
In situ PCB biouptake	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope (additional samples in the Tine Sled Mixed and Unmixed Tiller Treatment Areas not included since in situ baseline studies were not conducted in this area)
PCB aqueous equilibrium	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope plus 3 additional samples in the Tine Sled Mixed Treatment Area and 3 additional samples in the Unmixed Tiller Treatment Area
PCB desorption kinetics	6 locations in Mixed (Tiller) Treatment Area and 1 background location	Original scope plus 3 additional samples in the Tine Sled Mixed Treatment Area and 3 additional samples in the Unmixed Tiller Treatment Area
Sediment TOC/black carbon	6 core sections from each of 9 locations for baseline study (TOC and BC-T methods)	Original locations plus additional ten 5-point composite samples from the Mixed Tiller Treatment Area. Three discrete samples plus eight 5-point composite samples from each of the Tine Sled and Unmixed Tiller Treatment Areas. All samples to be analyzed for BC-C. [Note: Three samples in the original Unmixed Tiller Treatment Area reconfigured based on refined treated area boundaries (see ECN No. 1).] Two additional 5-point composite samples will be collected downstream of the Unmixed Tiller Treatment Area.
Sediment PCB	6 core sections from each of 9 locations for baseline study	Original scope in Mixed Tiller Treatment Area. [Note: Three samples in the original Unmixed Tiller Treatment Area reconfigured based on refined treated area boundaries (see ECN No. 1).] Three additional samples in the Tine Sled Mixed Treatment Area.
Microscopic examination	6 core sections from each of 9 locations for baseline study	Original scope plus 3 locations each from the Tine Sled and Unmixed Tiller Treatment areas (i.e., same locations as "Sediment PCB" listed above.)
Benthic Invertebrate Community Studies	6 locations in Mixed (Tiller) Treatment Area, 3 locations in the Unmixed Treatment Area , and 1 background location	Original scope plus 1 additional sample in the Tine Sled Mixed Treatment Area and 2 additional samples in the Unmixed Tiller Treatment Area. Therefore, a total of 6 samples will be collected from the Mixed Tiller Treatment Area, 3 samples from the Tine Sled Mixed Treatment Area and 3 samples from the Unmixed Tiller Treatment Area.
Erosion Potential Testing	5 locations sampled during baseline monitoring (3 Mixed Tiller Treatment Area, 2 Tine Sled Mixed Treatment Area)	Original scope in the Mixed Tiller Treatment Area plus 2 locations in the Tine Sled Mixed Treatment Area (reconfigured based on treated area configuration), and the addition of 2 locations in the Unmixed Tiller Treatment Area

References

Alcoa. 2006. Final Work Plan: In-Situ PCB Bioavailability Reduction in Grasse River Sediments. Submitted to EPA August 11, 2006.



LEGEND:

- T45 — 1992 SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- BENTHIC INVERTEBRATE COMMUNITY SAMPLING LOCATION
- M1 — IN-SITU BIOLOGICAL SAMPLING LOCATIONS
- UTA-17 — EX-SITU BIOLOGICAL BULK SEDIMENT SAMPLING LOCATIONS
- FLOW DIRECTION
- TARGET INITIAL TESTING AREA
- TARGET MIXED TILLER TREATMENT AREA
- TARGET UNMIXED TILLER TREATMENT AREA
- TARGET TINE SLED MIXED TREATMENT AREA

NOTE:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).

DRAFT

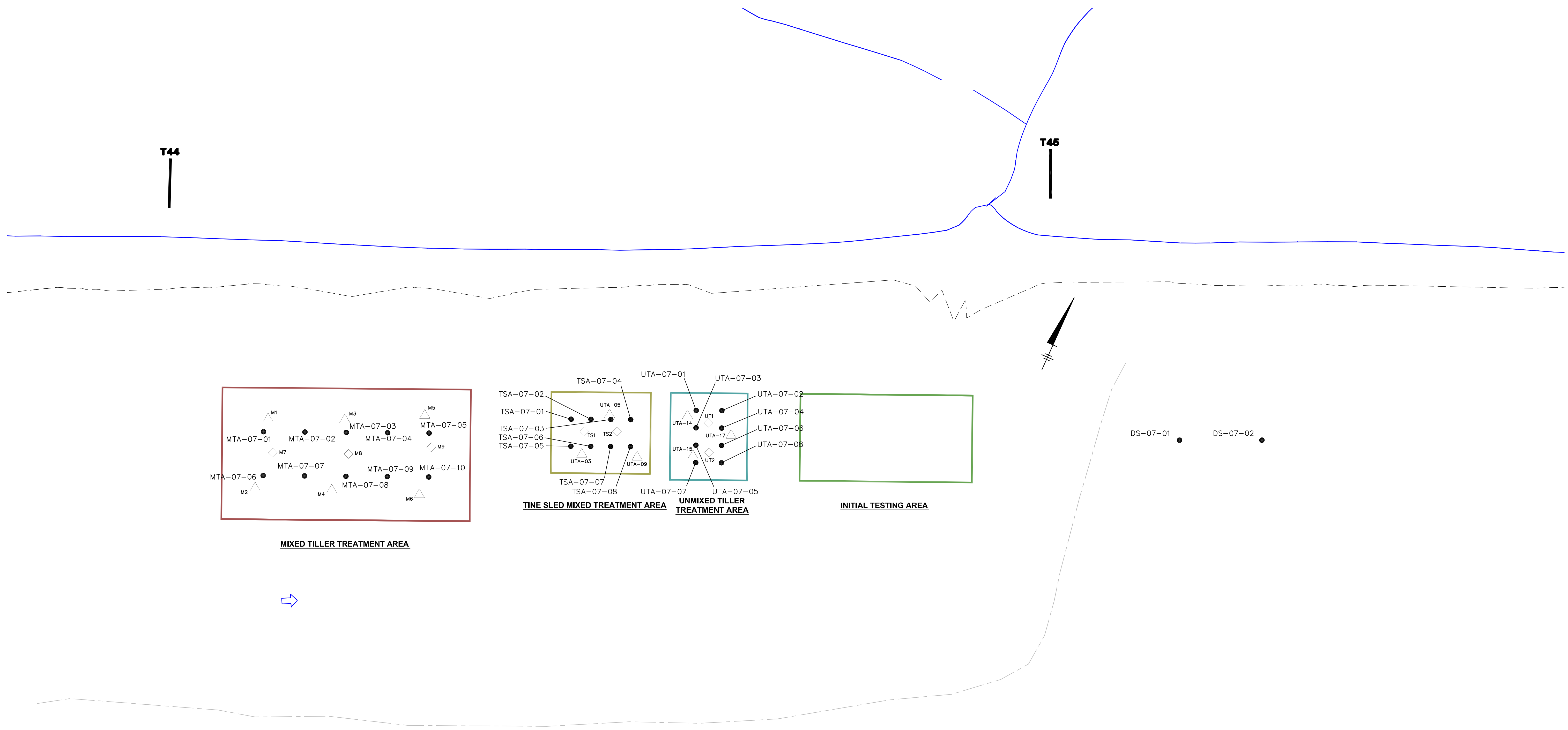
GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY
LONG-TERM MONITORING PROGRAM

BENTHIC INVERTEBRATE COMMUNITY AND BIOLOGICAL SAMPLING LOCATIONS

ALCOA

FIGURE **1**



LEGEND:

T45	1992 SEDIMENT PROBING TRANSECT
	RIVER BOUNDARY
	NEAR SHORE AREA BOUNDARY
UTA-03	SEDIMENT CORE COLLECTION LOCATION (BLACK CARBON [BC-C], MICROSCOPY, AND PCB ANALYSIS; SEE NOTE 2)
MTA-09	FIVE-POINT COMPOSITE SEDIMENT CORE COLLECTION LOCATION (BULK DENSITY, PERCENT MOISTURE, AND BLACK CARBON [BC-C] ANALYSIS; SEE NOTE 3)
M7	EROSION POTENTIAL TESTING LOCATION
	FLOW DIRECTION
	SILT CURTAIN LOCATION
	TARGET INITIAL TESTING AREA
	TARGET MIXED TILLER TREATMENT AREA
	TARGET UNMIXED TILLER TREATMENT AREA
	TARGET TINE SLED MIXED TREATMENT AREA

NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
2. SEDIMENT CORES WILL BE SEGMENTED 0–1.5 INCHES, 1.5–3 INCHES, 3–4.5 INCHES, 4.5–6 INCHES, 6–9 INCHES, AND 9–12 INCHES.
3. FIVE-POINT COMPOSITE SEDIMENT CORES COLLECTED IN THE TREATMENT AREAS WILL BE SEGMENTED 0–3 INCHES AND 3–6 INCHES. FIVE-POINT COMPOSITE SEDIMENT CORES COLLECTED DOWNSTREAM OF THE TREATMENT AREAS WILL BE SEGMENTED 0–3 INCHES.

0 30' 60'
GRAPHIC SCALE

DRAFT

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

ACTIVATED CARBON PILOT STUDY
LONG-TERM MONITORING PROGRAM

SEDIMENT SAMPLING LOCATIONS

ALCOA

FIGURE
2

SYR-85-KMD BCP JHR LAYER: ON=*, OFF=*REF*
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PROJECTNAME:----
XREFS: IMAGES:
10811X00 10811X01.TIF
10811X02

NO. 5 – CHANGE IN SCOPE OF THE LONG-TERM MONITORING PLAN

Change Number: 5 **Date:** October 19, 2007
Originator: Paul LaRosa

Change Notification: This Engineering Change Notice (No. 5) serves as notification to the USEPA by Alcoa of a change in the scope of the long-term monitoring plan for the Grasse River Activated Carbon Pilot Study (ACPS).

Basis for Change: As noted in response to the Agencies comments on the ACPS Construction Documentation Report (specifically comment no. 14), Alcoa proposed to amend the Year 1 long-term monitoring plan for the five-point composite coring locations shown on the attached figure. For coring locations within the treatment areas (26 locations), Alcoa proposes to collect samples representing the 6 to 12-inch interval in addition to the 0 to 3-inch and 3 to 6-inch intervals already specified in the monitoring program. Similarly, for coring locations downstream of the treatment areas (2 locations), Alcoa proposes to collect samples representing the 3 to 6-inch and 6 to 12-inch interval in addition to the 0 to 3-inch interval specified in the monitoring program. These new sample intervals (i.e., 3 to 6-inch intervals in the downstream coring locations and 6 to 12-inch intervals for all coring locations) will be held for potential future analysis of percent moisture, bulk density, and black carbon content using the chemical oxidation technique (BC-C). Samples for testing will be selected based on the black carbon content of the sample interval above (e.g., a particular 6-12 inch interval will be analyzed if the 3-6 inch interval at that location exhibited a relatively high level of black carbon) and/or visual observations during core processing (i.e., potentially identifying the presence of activated carbon at depth).

Schedule Impact/Documents Affected: There are no anticipated impacts to the overall project schedule resulting from this change.

Resolution: N/A

Level of Approval Required[1]:	Notification only to USEPA	☐
	Approval of USEPA Project Manager (with appropriate Agency review)	☒

Approval/Acceptance (as necessary):

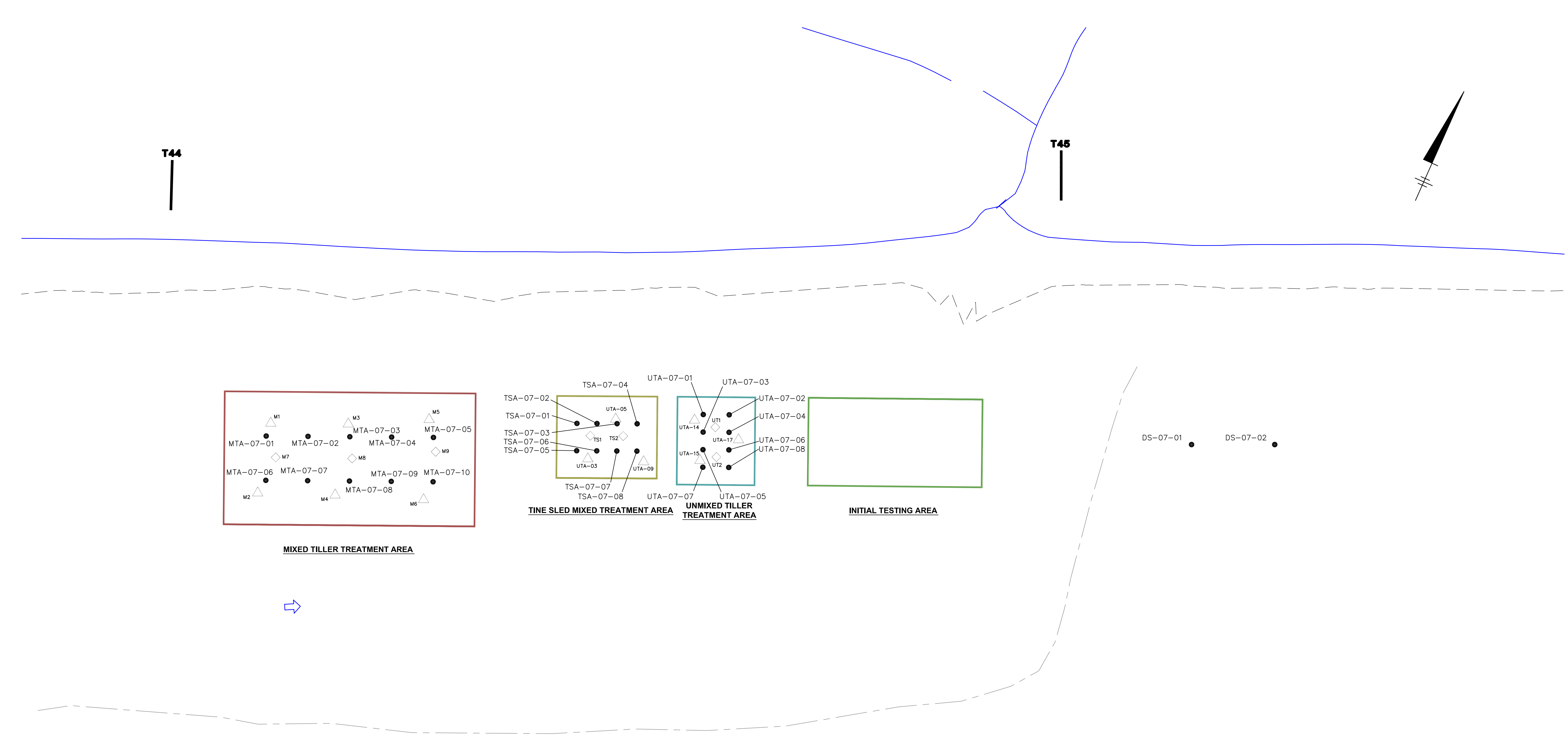
Alcoa Representative: _____ Date: _____

Agency On-Site Representative: _____ Date: _____

USEPA Project Manager: _____ Date: _____
(if necessary)

Distribution:	Young Chang, USEPA	Clay Patmont, Anchor
	Lawrence McShea, Alcoa	Heather VanDewalker, ABBL
	Bruce Cook, Alcoa	James Quadrini, QEA
	Paul LaRosa, Anchor	Upal Ghosh, UMBC

1 Level of approval required will be based on type of change being requested. Minor adjustments (e.g., movement of sampling locations, times) will require Agency notification only and not approval. Significant changes will require Agency approval.



LEGEND:

- T45 — 1992 SEDIMENT PROBING TRANSECT
- RIVER BOUNDARY
- NEAR SHORE AREA BOUNDARY
- UTA–03 — SEDIMENT CORE COLLECTION LOCATION (BLACK CARBON [BC–C], MICROSCOPY, AND PCB ANALYSIS; SEE NOTE 2)
- MTA–09 — FIVE–POINT COMPOSITE SEDIMENT CORE COLLECTION LOCATION (BULK DENSITY, PERCENT MOISTURE, AND BLACK CARBON [BC–C] ANALYSIS; SEE NOTE 3)
- M7 — EROSION POTENTIAL TESTING LOCATION
- FLOW DIRECTION
- SILT CURTAIN LOCATION
- TARGET INITIAL TESTING AREA
- TARGET MIXED TILLER TREATMENT AREA
- TARGET UNMIXED TILLER TREATMENT AREA
- TARGET TINE SLED MIXED TREATMENT AREA

NOTES:

1. BASEMAP TAKEN FROM PLANIMETRIC MAPPING PREPARED BY LOCKWOOD MAPPING, INC. USING 11/9/92 AERIAL PHOTOGRAPHY. EXTENT OF NEAR SHORE AREAS PROVIDED BY QUANTITATIVE ENVIRONMENTAL ANALYSIS, LLC (QEA).
2. SEDIMENT CORES WILL BE SEGMENTED 0–1.5 INCHES, 1.5–3 INCHES, 3–4.5 INCHES, 4.5–6 INCHES, 6–9 INCHES, AND 9–12 INCHES AND SUBMITTED FOR ANALYSIS.
3. FIVE–POINT COMPOSITE SEDIMENT CORES WILL BE SEGMENTED 0–3 INCHES, 3–6 INCHES, AND 6–12 INCHES AND SUBMITTED FOR ANALYSIS AS DESCRIBED IN ENGINEERING CHANGE NOTICE NO. 5.

0 30' 60'
GRAPHIC SCALE

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK
ACTIVATED CARBON PILOT STUDY

SEDIMENT SAMPLING LOCATIONS

ALCOA

FIGURE
1

SYR–85–KMD JHR LAF LAYER: ON=*, OFF=*REF*
G:\CAD\ACTIVE\~DWG\ACT\10811002\SEDIMENT\10811G01.DWG SAVED: 10/18/2007 1:41 PM LAYOUT: 1 PAGESETUP: DL2B–PDF PENTABLE: PLTFULL.CTB PRINTED: 10/18/2007 1:41 PM BY: LFORAKER
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10811X00 10811X01.TIF
10811X01

APPENDIX G

DAILY CONSTRUCTION REPORTS AND DOCUMENTATION

CONTRACTOR DAILY REPORTS

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT DATE **11-Sep-06** **MONDAY**	REPORT NO. **1**
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **clear and cool**	PM WEATHER **clean and mild**	Precip. **none**	MAX TEMP (F) **61** / MIN TEMP (F) **41**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Site Tour of SLSDC 0645 - Toured site and routes for deliveries	Bill Welch	TTEC	Health & Safety	10
	Safety Meetings (Alcoa Site Conditions and TTEC Safety Procedures)	Roger Bean	Brennan	site supervisor	10
	Project Review	Bruce Vongroven	Brennan	Safety/Mech.	10
	Task initiation Site Preparation	Steve Stroschein	Brennan	Safety/Mech.	10
	Meeting with St. Lawerence Seaway Development Corp.	Kevin Schuldt	Brennan	mech/deck hand	10
	Sign license agreement # DTSL55-06-L-C0901	Rich Tischer	Brennan	excavator operator	10
		Gerald Knisley	Brennan	GPS/Surveying	10
	@ 230 brennan crew went to SLSDC to offload manlift and train on	Chris Mayette	Brennan	operator/deckhand	10
	safe operation of manlift	Peter Deshane	Brennan	Crane Operator	10
		James Dunkley	Brennan	GPS/Surveying	10
				totsl hour from cont. sheet	40

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k**	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	150
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT**	**0.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[ ] YES**	**[X] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**150.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE			[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Reviewed Alcoa Safety Procedures- Training was performed by Bill Moon			
	Reviewed TtEC Site Specific Training - Bill Welch and Ray Mangrum			

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)				Hours used
	TtFWI	D3500 Dodge Truck	10			
	TtFWI	F150 Ford Truck	10			
	TtFWI	Conputers (2)	10			
	TtFWI	Printers (2)	10			
	Brennan	Crew Truck	10			
	Brennan	Crew Truck	10			
	Brennan	Crew Truck	10			
	Brennan	computer	10			
	Brennan	Manlift	10			

Schedule Activity No.	Remarks

Donal Ray Mangrum 11-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donal Ray Mangrum

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER 1

DATE 11-Sep-06

ALCOA GAC PROJECT

MONDAY

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
	Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	10
		Greg Smith	Brennan	GPS/SURVEYING	10
		Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
		Anthony Moselle	Brennan	Laborer	10
				Total	40

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**12-Sep-06**	**Tuesday**	REPORT NO.	**2**	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**				
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**				
AM WEATHER **clear and cool**	PM WEATHER **clean and mild**	Precip. **none**	MAX TEMP (F) **67**	MIN TEMP (F) **38**	

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	12
	Safety meeting conducted from 0700 to 0735	Bill Welch	TTEC	Health & Safety	12
	Travel to SLSDC property	Roger Bean	Brennan	site supervisor	11
	Begin off loading trucks	Bruce Vongroven	Brennan	Safety/Mech.	11
	Items received today	Steve Stroschein	Brennan	Safety/Mech.	11
	sectional barge #1, Sectional barge #2, Tug boat, manlift, crane, foklift	Kevin Schuldt	Brennan	mech/deck hand	11
	case excavator, Crew boxes, Surveying equipment, welder, generator, mats	Rich Tischer	Brennan	excavator operator	11
	Brennan crew offloaded 7 trucks	Gerald Knisley	Brennan	GPS/Surveying	12.5
	Crew work 1 hour late to offload the last truck	Chris Mayette	Brennan	operator/deckhand	11
		Peter Deshane	Brennan	Crane Operator	11
		James Dunkley	Brennan	GPS/Surveying	12.5
				totsl hour from cont. sheet	47

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	173
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT	150.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	323.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Reviewed procedures for working at SLSDC property	
	Reviewed AHA's for site preparation work	
	Beginning to get team approach to safety by getting crew involved.	
	Took forklift out of service due to broken mast. See photo in safety document.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received		
		2- crew boxes (connex)	Forklift	generator
		Tug boat	Welder	safety supplies
		2 sectionals barges	crane	river signs
		Crew boat	excavator	
		two loads of equipment mats	surveying equipment	

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)				Hours used
	TtFWI	D3500 Dodge Truck	10	Brennan	Crew boat	10
	TtFWI	F150 Ford Truck	10	Brennan	two loads of equipment mats	10
	TtFWI	Conputers (2)	10	Brennan	Forklift	10
	TtFWI	Printers (2)	10	Brennan	Welder	10
	Brennan	Crew Truck	10	Brennan	crane	10
	Brennan	Crew Truck	10	Brennan	excavator	10
	Brennan	Crew Truck	10	Brennan	surveying equipment	10
	Brennan	computer	10	Brennan	generator	10
	Brennan	Manlift	10	Brennan	safety supplies	10
	Brennan	2- crew boxes (connex)	10	Brennan	river signs	10
	Brennan	Tug boat	10	Brennan		
	Brennan	2 sectionals barges	10	Brennan		

Schedule Activity No.	Remarks
	Task today included the site preparaton. Brennan unloaded 7 loads of equipment. Safty inspection were performed during off loading operations.
	Problems with worker form SLSDC coming to the site to see what is going on, Roger talked with SLSDC safety to discuss this issue. We understand that
	we are working on their property, but we must keep them out of the active work areas.
	See continuation Page for additional items or task.

Donal Ray Mangrum 12-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donal Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | **REPORT NUMBER** 2 | **DATE** 12-Sep-06

ALCOA GAC PROJECT | **Tuesday**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	12.5
			Greg Smith	Brennan	GPS/SURVEYING	12.5
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	11
			Anthony Moselle	Brennan	Laborer	11
					Total	47
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate				
		the hazards				
	8:00 AM	Site meeting with JF Brennan personnel on crane location for all unloading				
		activities. Equipment and rigging were then inspected and documented.				
		All project personnel were invoived with todaays planned picks and assigned				
		areas of responsibilities.				
	9:15 AM	Unloaded container with safety equipment and tools. Removed safety cones				
		from the container to establish work zones around activie work areas.				
	10:30 AM	Unloaded first sectional barge and placed into the Grasse River inlet. Barge				
		was inspected and damages were documented.				
	11:30 AM	Unloaded excavator and moved it to an area away from t-site truck traffic.				
		Performed check in inspection on excavator and daily inspection both inspection				
		inspection area documented. A meeting was held with the GPS/Survey team				
		to discuss fall protection during installation of survey equipment on excavator.				
	1:00 PM	Second sectional barge arrived and the truck was spotted and the barge				
		Perform inspection of barge and documented the inspection				
	2:30 PM	Unload JF Brennan tugboat, Inspection and documentation was performed				
	4:00 PM	received two loads of oak equipment mats, trucks were spotted and unloaded				
	5:30 PM	Complete unloading of last truck for the day, clean area and report back to				
		building 65 to sign out.				
	7:30 PM	GPS/Survey crew woked late to get hard wiring complete prior to tomorrow				
		expected rain.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**13-Sep-06**	**Wednesday**	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO. **3**	
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **Cloudy and light rain**	PM WEATHER **cloudy and light rain**	Precip. **<.5"**	MAX TEMP (F) **57** / MIN TEMP (F) **48**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Safety meeting conducted from 0700 to 0720	Bill Welch	TTEC	Health & Safety	10
	Travel to SLSDC property	Roger Bean	Brennan	site supervisor	10
	Continue Off loading equipment and placing it into River	Bruce Vongroven	Brennan	Safety/Mech.	10
	Installed backup alarm on manlift	Steve Stroschein	Brennan	Safety/Mech.	10
	Switched out forklifts	Kevin Schuldt	Brennan	mech/deck hand	10
	Continue installation of GPS system	Rich Tischer	Brennan	excavator operator	10
	Performed Safety inspections on all equipment	Gerald Knisley	Brennan	GPS/Surveying	12.5
	Reviewed working ocnditions while extreme wet site conditions	Chris Mayette	Brennan	operator/deckhand	10
		Peter Deshane	Brennan	Crane Operator	10
		James Dunkley	Brennan	GPS/Surveying	12.5
				totsl hour from cont. sheet	45

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k**	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	160
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT**	**323.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**483.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Reviewed procedures for working at SLSDC property	
	Reviewed AHA's for site preparation work	
	Beginning to get team approach to safety by getting crew involved.	
	Took forklift out of service due to broken mast. See photo in safety document.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received		
		2- crew boxes (connex)	Forklift	generator
		Tug boat	Welder	safety supplies
		2 sectionals barges	crane	river signs
		Crew boat	excavator	
		two loads of equipment mats	surveying equipment	

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)				Hours used
	brennan	received 11 sectional barges	10			
	brennan	equipment loading ramps	10			
	brennan	Crew boat	10			
	brennan	2- small floats	10			

Schedule Activity No.	Remarks
	Task today included the site preparation. Brennan unloaded 12loads of equipment. Safety inspection were performed during off loading operations.
	See continuation Page for additional items or task.

Donald Ray Mangrum (signature) — 13-Sep-06

CONTRACTOR/SUPERINTENDENT — DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | **REPORT NUMBER** 3 | **DATE** 13-Sep-06

ALCOA GAC PROJECT | **Wednesday**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	12.5
			Greg Smith	Brennan	GPS/SURVEYING	12.5
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate			Total	45
		the hazards				
	8:00 AM	Equipment and rigging were inspected and documented.				
		All project personnel were involved with today's planned picks and assigned				
		areas of responsibilities.				
	8:30 PM	received sectional barge, off load and place in river				
	9:15 AM	received sectional barge, off load and place in river				
		Barges are inspected and documented prior to deployment				
	10::00 AM	received sectional barge, off load and place in river				
		Barges are inspected and documented prior to deployment				
	11::00 AM	received sectional barge, off load and place in river				
		Barges are inspected and documented prior to deployment				
	12:00 Noon	received sectional barge, off load and place in river				
		Barges are inspected and documented prior to deployment				
	12:30 PM	Install backup alarm for on man lift and changed				
		out the damaged forklift				
	1:00 PM	Second sectional barge arrived and the truck was spotted and the barge				
	1:45 PM	Received brennan truck with two floats, loading ramps and crew boat				
	2:30 PM	received sectional barge, off load and place in river				
	3:00 PM	received sectional barge, off load and place in river				
	4:00 PM	received sectional barge, off load and place in river				
	4:30 PM	received sectional barge, off load and place in river				
	general	Continued working on GPS system for roto tiller and excavator				
	4:45 PM	Shut down and secured equipment				
	5:00 PM	Sign out at bldg 65 and guard house 1				
	7:30 PM	GPS/Survey crew worked late to get hard wiring complete prior to tomorrow				
		expected rain.				
		Received 32 buoys for turbidity curtain				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**14-Sep-06**	**Thursday**	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO. **4**	
CONTRACTOR **Tetra Tech FW, Inc.**	TtECI Project Manager **Ray Mangrum**		
AM WEATHER **Cloudy and rain**	PM WEATHER **cloudy and rain**	Precip. **1.0"**	MAX TEMP (F) **64** / MIN TEMP (F) **57**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0720	Roger Bean	Brennan	site supervisor	10
	Continue Off loading equipment and placing it into River	Bruce Vongroven	Brennan	Safety/Mech.	10
	Complete placement of flex-a-floats for marine plant 1 and 2	Steve Stroschein	Brennan	Safety/Mech.	10
	Begin placing suplieson marine plant #2	Kevin Schuldt	Brennan	mech/deck hand	10
	Continue installation of GPS system	Rich Tischer	Brennan	excavator operator	10
	Performed Safety inspections on all equipment	Gerald Knisley	Brennan	GPS/Surveying	12.5
	Reviewed working ocnditions while extreme wet site conditions	Chris Mayette	Brennan	operator/deckhand	10
	Safety meeting conducted from 0700 to 0720	Peter Deshane	Brennan	Crane Operator	10
		James Dunkley	Brennan	GPS/Surveying	12.5
				totsl hour from cont. sheet	42

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	157
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT	483.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	640.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Covered TtEC ZIP policies	
	Collected medical data sheets	
	Hot work was performed and documented	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)		Hours used
	brennan	received 3 sectional barges	10	
	brennan	received 18 500# anchors	10	
	brennan	received 12 400# anchors	10	
	brennan	Received anchor chain	10	

Schedule Activity No.	Remarks
	Task today included the site preparation. Brennan unloaded 12loads of equipment. Safety inspection were performed during off loading operations.
	See continuation Page for additional items or task.

Donald Ray Mangrum 14-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER 4

DATE 14-Sep-06

ALCOA GAC PROJECT

Thursday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	11
			Greg Smith	Brennan	GPS/SURVEYING	11
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate			Total	42
		the hazards. Discussed arriving and leaving SLSDC facility				
	7:20 AM	Equipment and rigging were inspected and documented.				
		All project personnel were involved with today's planned picks and assigned				
		areas of responsibilities.				
	7:45 AM	Begin assemblying marine plants 1 and 2. Several movements were made				
		so marine plant assembles could be completed. Installed 320 lf of 2 x 4 lumber				
		on the marine plants to cover joints between barges to develop a smoothe surface				
	11:30 AM	received sectional barge, off load and place in river				
		Barges are inspected and documented prior to deployment				
	12:15 AM	received sectional barge, off load and place in river				
		Barges are inspected and documented prior to deployment				
	1:00 PM	Received turbidity curtain anchors				
		18-500# and 12-400#				
	1:45 PM	Begin unloading container for carbon storage				
		small equipment eas temporarly staged adjacent to containers				
	2:30 PM	Begin cutting 3/8" chain for buoys anchors				
	4:00 PM	received sectional barge, off load and place in river				
	4:30 PM	Begin Installation of spud wells				
	4:45 PM	Shut down and secured equipment				
	general	Continued working on GPS system for roto tiller and excavator				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE **15-Sep-06**	**Friday**			
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT NO. **5**	
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager Ray Mangrum**		
AM WEATHER **cloudy**	PM WEATHER **cloudy**	Precip. **none**	MAX TEMP (F) **67**	MIN TEMP (F) **51**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	11
	Travel to SLSDC property	Bill Welch	TTEC	Health & Safety	11
	Safety meeting conducted from 0700 to 0720	Roger Bean	Brennan	site supervisor	11
	Continue Off loading equipment and placing it into River	Bruce Vongroven	Brennan	Safety/Mech.	11
	Completed marine Plant 2 with exception of large equipment loading	Steve Stroschein	Brennan	Safety/Mech.	11
	Continue placing supplies/equipment on marine plant #2	Kevin Schuldt	Brennan	mech/deck hand	11
	Continue installation of GPS system	Rich Tischer	Brennan	excavator operator	11
	Performed Safety inspections on all equipment	Gerald Kinsely	Brennan	GPS/Surveying	0
	Reviewed working conditions while extreme wet site conditions	Chris Mayette	Brennan	operator/deckhand	11
	Received turbidity curtain late Friday afternoon crew stayed late to unload	Peter Deshane	Brennan	Crane Operator	11
		James Dunkley	Brennan	GPS/Surveying	13
				totsl hour from cont. sheet	22

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	134
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT**	**640.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**774.00**

Schedule Activity No.	**LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE**	**[X] SAFETY REQUIREMENTS HAVE BEEN ME**
	During equipment inspection, one barge had several holes drilled into it. The vendor was	
	notified and he gave us permission to repair the holes. INSPECTIONS WORK	
	Hot work was performed and documented	
	Performe Team safety inspection	
	TtEC Sitie Safety Officer escorted BB & L film crew.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	**Submittal #**	**Description of Equipment Received**

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	**OWNER**	**Description of Construction Equipment Used Today (incl. Make and Model)**		**Hours used**
	brennan	received 2 supply barges	10	
	brennan	Alcoa furnished turbidity curtain	10	
	brennan	Crew Boat	10	
	brennan	roto tiller	10	

Schedule Activity No.	**Remarks**
	Site Preparation continued today. Marine plant 1 and 2 are in the water and being loaded with supplies and equipment.
	Preparation for carbon delivery
	Received Alcoa Furnished turbidity curtain today. From initial inspection, the curtain looks to be in bad shape.
	See continuation Page for additional items or task.

Donald Ray Mangrum 15-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 5 | DATE 15-Sep-06

ALCOA GAC PROJECT | Friday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	11
			Anthony Moselle	Brennan	Laborer	11
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate			Total	22
		the hazards. Discussed arriving and leaving SLSDC facility				
	7:20 AM	Dicussed information gathered while meeting with the US Coast Guard				
		Containment boom, oil,fuel,other item inventory, lights for buoys				
		and turbidity curtains				
	8:00 AM	Performed rigging and equipment inspections				
		Performed the initial inspection of the 33 ton crane that will be placed on barge				
		Performed operators observation for all operators				
	9:00 AM	Reveive a truck with tiller and crew bost				
		Off loaded and inspected				
	9:30 AM	received truck with cantainment boom				
		offloaded and staged				
	10:30 AM	Received two 10' X 30' baarges for local vendor. The first barge was inspected				
		and unloaded. The second barge was inspected and several holes were found				
		in the hull. Brennan contacted tt and discussed if the barge should be send back				
		or culd they repair it. Repairs were performed once the safety procedures were				
		approved.				
	12:00-5:00 PM	Both marine plants were prepared this afternoon. Crane mats were placed,				
		container were placed and carbon mixing equipment was placed as shown on				
		the work plan. Several site meeting were conducted to discuss each task prior				
		to starting the task.				
	5:15 PM	Turbidity curtain, furnished by Alcoa, was delivered to the SLSDC Facility				
		Unloading took until 6:00 PM.				
	6:00 PM	Secure equipment and site				
		Continued working on GPS system for roto tiller and excavator				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT DATE **18-Sep-06** **Monday**	REPORT NO. **6**
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **clear and mild**	PM WEATHER **clear and mild windy late in afternoon**	Precip. **none**	MAX TEMP (F) **81**	MIN TEMP (F) **57**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0720	Roger Bean	Brennan	site supervisor	10
	Brennan personnel continued placing equipment and supplies on	Bruce Vongroven	Brennan	Safety/Mech.	10
	marine plants 1 and 2	Steve Stroschein	Brennan	Safety/Mech.	10
	Several of the project team took a tour of the river and inspected the	Kevin Schuldt	Brennan	mech/deck hand	10
	work area	Rich Tischer	Brennan	excavator operator	10
	Continue working on GPS/Survey control	Kenny Manning	Brennan	Engineer	10
	Discuss survey point with BB&L the team decided to use the previous	Chris Mayette	Brennan	operator/deckhand	10
	benchmark that BB & L is using	Still need Name	Brennan	Crane Operator	10
		James Dunkley	Brennan	GPS/Surveying	10
				totsl hour from cont. sheet	20

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	130
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT	774.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	904.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Discussed fog in the morning and driving to work	
	Issued hot work permit during site preparation	
	Inspection of equipment used today	
	Discussed slip trip and fall	
	Discussed fall protection while working near dock	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Site Specific HASP training for new crane operator and operators union business agent

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used

Schedule Activity No.	Remarks
	Site Preparation continued today. Last laod did not come today, which caused us not to load the crane onto the barge
	Instection of turbidity curtain
	Discussed GPS/Surveying with BBI and Brennan. Decided to utilize BBL benchmark
	See continuation Page for additional items or task.

Donald Ray Mangrum — 18-Sep-06

CONTRACTOR/SUPERINTENDENT — DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | **REPORT NUMBER** 6 | **DATE** 18-Sep-06

ALCOA GAC PROJECT | **Monday**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate			Total	20
		the hazards. Discussed arriving and leaving SLSDC facility				
	7:30 AM	Performed rigging and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files				
	8:30 AM	Turbidity curtain anchors arrive onsite. Anchors were offloaded and staged				
		to the side until they need to be loaded onto the marine plant				
		Will perform count on weights and anchors				
	9:00 AM	The remainer of the day was spent on general marine plant setup and				
	to	preparation. Dicisions were make on different setup procedures and turbidity				
	5:00 PM	curtain installation. Moved marine plant #2 to loading area so the crane and				
		other equipment can be loaded. Fuel tank and containment arrived today				
		and was loaded onto marine plant #1.				
		Major item for today, the truck with the cabin for tony B did not show up.				
		It is critical that the tug gets up and running. Marine plant movements are				
		currently being moved with crew boats. With equipment loaded, the crew boats				
		will not be able to move the marine plants.				
		The truck is in the area but will not be in Massena until after 7:00 PM so we				
		told him to call Tuesday morining and he will be lead to the site for offloading.				
		Continued working on GPS system for roto tiller and excavator				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**19-Sep-06**	**Tuesday**	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO.	**7**
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**		

AM WEATHER	PM WEATHER	Precip.	MAX TEMP (F)	MIN TEMP (F)
cloudy and rain	**cloudy turning clear by late afternoon**	**trace**	**71 AM**	**66 PM**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0720	Roger Bean	Brennan	site supervisor	10
	Alcoa inspection of marine plants by Mr. Ralph Bathelt, Sr. Env. Staff	Bruce Vongroven	Brennan	Safety/Mech.	10
	Received tug boat cabin early this morning	Steve Stroschein	Brennan	Safety/Mech.	10
	Installed tug boat cabin	Kevin Schuldt	Brennan	mech/deck hand	10
	Continue placing equipment on marine plants	Rich Tischer	Brennan	excavator operator	10
	Loaded crane on marine plant #2	Kenny Manning	Brennan	Engineer	10
	At 4:00 discovered carbon was not on site. Contacted Calgon and received	Chris Mayette	Brennan	operator/deckhand	10
	shipping document indicating it was deliverd to SLSDC on 9/15/06. This was	Rod Smith	Brennan	Crane Operator	10
	confirmed by Rodger Bean	James Dunkley	Brennan	GPS/Surveying	10
	Developed manpower and equipment tracking form for BB&L			totsl hour from cont. sheet	20

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k**	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	130
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT**	**904.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**1,034.00**

Schedule Activity No.	**LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE**	**[X] SAFETY REQUIREMENTS HAVE BEEN ME**
	Discussed AHA'S for turbidity Curtain deployment	
	Inspection of equipment used today	
	Inspection by Ralf Bathelt, Alcoa's Sr. Environmental Staff, prior to getting marine plants	
	in the river.	
	Requested that Brennan make a plan view of each marine plant indicating emergency equipment and H & S supplies	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	**Submittal #**	**Description of Equipment Received**
		12K pounds of carbon furnished by Alcoa

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	**OWNER**	**Description of Construction Equipment Used Today (incl. Make and Model)**			**Hours used**
		Tine Sled			
		Cabin for tony b tug boat			

Schedule Activity No.	**Remarks**
	Site Preparation continued today. Last load did come today, which allowed us to get the tug read for operation.
	Moved marine plants utilizing tug, loaded truck crane on marine plant 2
	Called about carbon shipment, found carbon at SLSDC yard, driver did not notify Brenna and SLSDC did not call. Carbon was deliverd 9/15/06
	See continuation Page for additional items or task.

Donald Ray Mangrum   19-Sep-06

CONTRACTOR/SUPERINTENDENT   DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER 7

DATE 19-Sep-06

ALCOA GAC PROJECT

Tuesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate			Total	20
		the hazards. Discussed arriving and leaving SLSDC facility				
	7:30 AM	Performed rigging and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files				
	8:30 AM	Ton y B Tug Boat cabin arrrived on site along with the tine sled				
		After rigging inspections were completed, the cabin was off loaded and				
		Place on the tug.				
	9:00 AM	Discussed arrangement for marine plant #2 and means of loading				
		the truck crane.				
	10:00 AM	Prepared the site for laoding the truck crane on marine plant #2				
		Loading ramps were placed and secured to the marine plant				
		Had to adjust mats so outrigger were centered on them.				
		Loading went well				
	10:30 AM	Began loading turbidity curtain on the supply barge. Also loaded the				
		chains, anchors, weights, and buoys on marine plant #2				
	3:00 PM	Moved marine plant #2 out of loading area and then moved marine plant #1				
		into the loading area. Moved loading ramps to marine plant #1 and secured				
		them to the deck. Loaded excavator and roto tiller.				
		Loading went well.				
	4:15 PM	Moved both marine plants back to dock for the night. Marine plant #1 was				
		placed first followed by marine plant #2. This will allow marine plant # 2 to be				
		moved tomorrow without moving marine plant #1.				
		Continued working on GPS system for roto tiller and excavator				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE **20-Sep-06**	**Wednesday**			
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO. **8**		
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**			
AM WEATHER **Clear and cool**	PM WEATHER **clear/cloudy/rain**	Precip. **trace**	MAX TEMP (F) **62**	MIN TEMP (F) **54**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0720	Roger Bean	Brennan	site supervisor	10
	Alcoa performed their first Safey audit today, Minor finding, findings are	Bruce Vongroven	Brennan	Safety/Mech.	10
	documented and SPA assigned to corrective actions	Steve Stroschein	Brennan	Safety/Mech.	10
	10:00 AM team meeting, discussed progress to date and planned events	Kevin Schuldt	Brennan	mech/deck hand	10
	Marine plant #2 was moved up river to begin deploying turbidity curtains	Rich Tischer	Brennan	excavator operator	10
	TtEC performed our first weekly safety inspection	Kenny Manning	Brennan	Engineer	10
	Continued working on marine plant #1 to get it ready for Mondays deployment	Chris Mayette	Brennan	operator/deckhand	10
	Attached the roto-tiller to the excavator, GPS/Survey crew is installing	Rod Smith	Brennan	Crane Operator	10
	insturmentation on the tiller.	James Dunkley	Brennan	GPS/Surveying	10
	Submitted plan view of both marine plants and fuel, oils, grease volumes			totsl hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	140
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT**	**1,034.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**1,174.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Discussed river work hazards	
	Reviewed emergency procedures for fire, injurys, or man overboard. Thre or more blast of the horn signals an emerge	
	One on Blast indicate evacuation of the marine plant	
	Weekly TtEC safety inspection	
	Alcoa performed their first Safey audit today, Minor findings	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
	work	**GPS/Survey - Excavator is on marine plant #1 and tiller has been attached**	
		and mechanically tested as far as motion and hydraulics. The rotation sensors has	
		been attached but not tested, will perform test in am tomottow. The pitch and	
		roll sensors for the tiller is not installed, they will be mounted and tested tomorrow.	
		The telemetry link from marine plant is working and data is successfully being	
		transmitted to the excavator. Sensor offsets were measured today and new	
		drivers added I Hypack. Jerry will be on site tomorrow to finalize calibration.	
	quality	**All RTK GPS receivers are now working normally and precise positions relative to**	
		the controls are being made.	
		A quick upstrram RTK GPS check was made of the silt curtain position at approx:	
		2:30 PM and turbidity curtain is in the right place.	
		Tomorrow all system calibrated and perform QA/QC test to verify accuracy.	

Schedule Activity No.	Remarks
	Moved marine plant #2 up river to begin deploying turbidity curtain. Marine plant #2 is still being prepared for movement on Friday.
	Working with GPS system on roto-tiller, Brennan is task to get real data generated from the equipment by late tomorrow.
	Continue working to complete the corrective action items, safety signs wil be in tomorrow.
	Deployed 300 LF of turbidity curtain today. This included all anchors and tie offs. Buoys lights were installed prior toleaving the site.
	Additional 300 LF are strung out and ready to deploy tomorrow.

Donald Ray Mangrum 20-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | **REPORT NUMBER** 8 | **DATE** 20-Sep-06

ALCOA GAC PROJECT | Wednesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	10
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate			Total	30
		the hazards. Discussed Emergency procedures and equipment inspections				
	7:30 AM	Performed rigging and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files				
	8:30 AM	Moved marine plant #2 up river to testing area to begin deployment of				
		the turbidity curtain. Care was taken to ensure that the marine plant				
		and tug stayed in deep water				
	9:30 AM	Arrived at the test area and started preparations for turbidity curtain				
		deployment. Crew discussed procedures prior to beginning the task.				
	10:30 AM	Crew began turbidity curtain deployment. Continued deploying turbidity				
	to	curtain until 4:30. Installed approximately 300 LF of curtain				
	4:30 PM	Turbidity Curtain Buoys and lights were install to delineate the curtain.				
	4:30 PM	Crew stabilized the site and then loaded into crew boat and returned to				
		SLSDC docks				
	8:00- 5:00	Portion of the crew continued working on marine plant #1 to prepare it for				
		Mondays operations. The GPS crew worked all day getting the roto-tiller				
		wired and communicating with the receivers.				
		This crew also unloaded the carbon adjacent to marine plant #1.				
		Continued working on GPS system for roto tiller and excavator				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	21-Sep-06	Thursday	
CONTRACT NO. MSA	TITLE AND LOCATION ALCOA GAC PROJECT	REPORT NO. 9	
CONTRACTOR Tetra Tech FW, Inc.	TtECI Project Manager Ray Mangrum		
AM WEATHER Clear and cool	PM WEATHER clear and cool	Precip. 0	MAX TEMP (F) 59 / MIN TEMP (F) 41

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Alcoa ERT instucted crew on fire extingusher safety	Bruce Vongroven	Brennan	Safety/Mech.	10
	Continue working on marine Plant #1 to prepare it for deploying on Friday	Steve Stroschein	Brennan	Safety/Mech.	10
	GPS/SURVEY crew continue working on roto-tiller to get instrumentation	Kevin Schuldt	Brennan	mech/deck hand	10
	working properly.	Rich Tischer	Brennan	excavator operator	10
	Team Safety meeting @ 10:00 AM, Meeting at 12:00 to discuss potential	Kenny Manning	Brennan	Engineer	10
	issues prior to Monday, Meeting at 2:00 PM with Stake holders	Chris Mayette	Brennan	operator/deckhand	10
	Discovered tha we did not have enough turbidity curtain, Several issues were	Rod Smith	Brennan	Crane Operator	10
	discovered, 1- Brennan had moved the curtain out an additional 50' and down	James Dunkley	Brennan	GPS/Surveying	10
	river 50', this was not what was in the plan. Worked w/ BBL to solve problem			totsl hour from cont. sheet	40

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	150
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes ATttach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMILATIVE TOTAL OF WORK HOURS FROM PREVISOUS REPORT	1,174.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	1,324.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Fire Extingusher Training	
	Team Safety Meeting	
	TT/Brennan/CDM was assigned to develop a plan for site visitors during project	
	A plan was developed and will be submitted tomorrow for approveal by team members	
	Reviewed action items and corrective actions for the project.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used

Schedule Activity No.	Remarks
	Marine Plant #2 remained on the river and continued deploying turbidity curtain. Brennan found an additional 300 LF of curtain and ordered it
	for delivery tomorrow. This material was placed on a Hot-Shot service for quick delivery
	Safety signs arrived at Fastenal but due to work load today, we caould not break away and pick the signs up
	Deployed 200 LF of turbidity curtain today. 200 LF was removed from up stream and placed down stream so work can continue on Monday.
	Anchors and weights are deployed for the remaining curtain once it arrives onsite.

Donald Ray Mangrum 21-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1	REPORT NUMBER 9			DATE 21-Sep-06
	ALCOA GAC PROJECT			Thursday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	10
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	10
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed Emergency procedures and fire training			Total	40
	7:30 AM	Performed rigging and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files				
	8:30 AM	Site discussion on remaining deployment of turbidity curtain. During our meeting				
		we discovered that two of the curtains were only 10' X 2' instead of 100' x 15'.				
		Call was made to building 65 to discuss this issue				
	9:30 AM	Continue deploying tha last 200' of curtain we had remaining on the supply				
		barge. After deployment we discovered that 500 ' installed was 50 ' wider than				
		original planned. After discussions with BB & L we were told we could leave the				
		curtain as deployed, but we still 200' short of curtain to complete the project				
	3:00 PM	We were told to remove the 200' of curtain upstream and place it at the down				
		stream end so work can continue on Monday.				
		Work continue on GPS positioning system. Will have update in tomorrows meeting				
	8:00- 5:00	Portion of the crew continued working on marine plant #1 to prepare it for				
		Mondays operations. The GPS crew worked all day getting the roto-tiller				
		wired and communicating with the receivers.				
		This crew also unloaded the carbon adjacent to marine plant #1.				
		Continued working on GPS system for roto tiller and excavator				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT DATE **22-Sep-06** **Friday**; REPORT NO. **10**
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**	
AM WEATHER **Clear and cool**	PM WEATHER **Clear and mild**	Precip. **0**	MAX TEMP (F) **64** / MIN TEMP (F) **43**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Discussed electrical cord inspections and using cell phone while refueling	Bruce Vongroven	Brennan	Safety/Mech.	10
	Brennan submitted real time data generated from the positioning	Steve Stroschein	Brennan	Safety/Mech.	10
	equipment located on marine plant #1. Team discussion on submittal needed	Kevin Schuldt	Brennan	mech/deck hand	10
	for next week deployment operations pertaining to GPS positioning.	Rich Tischer	Brennan	excavator operator	10
	Team production meeting conducted at 10:00 AM	Kenny Manning	Brennan	Engineer	10
	Marine plant #1 continued working on unit to prepare it for Mondays	Chris Mayette	Brennan	operator/deckhand	10
	operations. Marine plant #1 was moved to test area up river.	Rod Smith	Brennan	Crane Operator	10
	Marine Plant #2 continue working on turbidity curtain deployment on the	James Dunkley	Brennan	GPS/Surveying	10
	500 lf currently place around proposed operation area.			totsl hour from cont. sheet	40

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	150
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**1,324.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**1,474.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Cell phones and re-fueling does not mix. Static electricity and re-fueling	
	Discusses safety procedures for site visitors	
	Ordered safety banner for office entrance	
	Installed electrical service to temporary building so radio can be charged daily	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Submittal for Process control for roto-tiller and sled tine systems
		Number units within test area, mix area and unmixed area.

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used

Schedule Activity No.	Remarks
	Received turbidity curtains for the upstream end of the proposed layout. Shipment arrived at 12:00 noon
	Marine Plant #1 and #2 are staged at the proposed test location

Donald Ray Mangrum 22-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 10 | DATE 22-Sep-06

ALCOA GAC PROJECT | Friday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	10
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	10
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed Emergency procedures and fire training			Total	40
	7:30 AM	Performed rigging and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files				
	8:00 AM	Marine Plant #2 crew moved up river to continue installation of the				
		turbidity curtain. Lacing of the previously place curtain was performed today				
		Marine plant #1 continue work on claibration of the positioning equipment				
		on the hydraulic excavator.				
		Marine plant #1 was moved up river and staged next to the test are for				
		Mondays operations.				
		Marine Plant #2 crew worked all day finializing the deployment of the				
		500 Lf of turbidity curtain. This included placing additional anchors and				
		lacing the curtains at each seam.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**25-Sep-06**		**Monday**
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT NO. **11**
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**	
AM WEATHER **Clear and cool**	PM WEATHER **partly cloudy and cool**	Precip. **0**	MAX TEMP (F) **59** / MIN TEMP (F) **39**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Discussed AHA's for carbon deployment and working on water	Bruce Vongroven	Brennan	Safety/Mech.	10
	Brennan crew went to the site at 8:00 AM and began preparations for todays	Steve Stroschein	Brennan	Safety/Mech.	10
	test. James returned to SLSDC dock and picked Bill and myself up to	Kevin Schuldt	Brennan	mech/deck hand	10
	take us to the marine plants.	Rich Tischer	Brennan	excavator operator	10
	Brennan installed additional connectors to the roto-tiller cables	Kenny Manning	Brennan	Engineer	10
	prior to starting the operations	Chris Mayette	Brennan	operator/deckhand	10
	Marine plants had to be positioned first thing this morning	Rod Smith	Brennan	Crane Operator	10
	Marine plants 1 and 2 were joined togeather to work as one marine plant and	James Dunkley	Brennan	GPS/Surveying	10
	to stabilize the tilt of the barges when the excavator reached out.			totsl hour from cont. sheet	60

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE?** **(IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	170
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? **(IF yes Attach Copy of Completed OSHA Report)**	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**1,474.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT **(if YES attach description of incident and proposed action)**		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**1,644.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	**[X] SAFETY REQUIREMENTS HAVE BEEN ME**
	Working on water crafts	
	visitor safety at the test site	
	It was noted that during the first test, the marine plants had to many people on it to work	
	safely. We understand that this was the first day and everyone wanted to see the operations	
	but during the project we need to keep visitor to a minimum.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Draft of tine sled process operations for carbon deployment
		received the remainder of the carbon

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
	brennan	**190 excavator**	

Schedule Activity No.	Remarks
	Began initial test within the test area

CONTRACTOR/SUPERINTENDENT: Donald Ray Mangrum

DATE: 25-Sep-06

CONTINUATION PAGE FROM SHEET 1 — **REPORT NUMBER** 11 — **DATE** 25-Sep-06

ALCOA GAC PROJECT — **Monday**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
		Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	10
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	10
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed Emergency procedures and fire training	Tony Binsfeld	Brennan		10
	7:30 AM	Performed rigging and equipment inspections				60
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:30 AM	Continued preparation of marine plants for carbon deployment				
	to	1) mixed 27 bukets of carbon for tomorrows deployment				
	11:00 AM	2) installed connectors to roto-tiller				
		3) adjust calibration of turbidity meter				
		4) checked RPM of hydraulic motors				
		5) Lost signal from excavator to barge once the power was changed from				
		AC to DC. Rebooted the system an all work correctly. The wireless link				
		between the two units were not reading each other				
	11:30 AM	BB&L started recording the visual of the roto-tiller being placed into the water				
		this was done at different water depths				
	12:15 PM	Roto-Tiller positioned in location for the first test. Process operation began on deck				
		while the roto-tiller was being placed in position for deployment.				
		This first area took about 1 1/2 hours to complete due to viewing and				
		checking the turbidity. The next 8 sections averaged approximately 1/2 hour				
		each, including positioning the barges to ensure they were square with the				
		test area.				
		Positioning device worked well. You are able to view real time data				
		within the connex box while operator is placing the roto-tiller				
		Good first day of carbon deployment				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**26-Sep-06**	**Tuesday**	REPORT NO.	**12**
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**			
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**			
AM WEATHER **partly cloudy**	PM WEATHER **partly cloudy and cool**	Precip. **rain last night** **0**	MAX TEMP (F) **59**	MIN TEMP (F) **42**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0600	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Crew travel to test area to begin the next 6 foot prints. Inspection equipment	Bruce Vongroven	Brennan	Safety/Mech.	10
	was completed prior to their use.	Steve Stroschein	Brennan	Safety/Mech.	10
	The first three foot prints was completed using a double dose of carbon	Kevin Schuldt	Brennan	mech/deck hand	10
	the next three foot print were unmixed areas with the first two receiving	Rich Tischer	Brennan	excavator operator	10
	a regular dose of carbon and the final foot print received a double dose	Kenny Manning	Brennan	Engineer	10
	of carbon. Upon completion, the crew broke up and moved marine plant #2	Chris Mayette	Brennan	operator/deckhand	10
	back to SLSDC to load remaining carbon and excavator. The turbidity	Rod Smith	Brennan	Crane Operator	10
	curtains were loaded moved to the work site for future deployment.	James Dunkley	Brennan	GPS/Surveying	10
				totsl hour from cont. sheet	60

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE?** **(IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	170
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? **(IF yes Attach Copy of Completed OSHA Report)**	**[ ] YES**	**[X] NO**	**CUMILATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**1,644.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT **(if YES attach description of incident and proposed action)**		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**1,814.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	training of several groups of visitors	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used

Schedule Activity No.	Remarks
	completed scheduled 6 foot prints and then began preparing the marine plants for tine sled carbon deployment.

Donald Ray Mangrum 26-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1	REPORT NUMBER 12			DATE 26-Sep-06	
	ALCOA GAC PROJECT			Tuesday	
	WORK PERFORMED TODAY				
SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
	Safety Meetings	Jay Wise	Brennan	GPS/SURVEYING	10
		Greg Smith	Brennan	GPS/SURVEYING	0
		Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
		Anthony Moselle	Brennan	Laborer	10
	7:00 AM Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	10
	and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
	the hazards. Discussed Emergency procedures and fire training	Tony Binsfeld	Brennan		10
	7:30 AM Performed rigging and equipment inspections				60
	Inspections on all equipment including generator, air compressor, welder				
	Documented inspections for office files. Inspection of hydraulic systems				
	7:30 AM Completed the six foot prints scheduled for today.				
	to				
	11:00 AM				
	11:00 AM Sent small brage to SLSDC to load turbidity curtain				
	to Moved marine plant #2 to SLSDC to load the remaining carbon and				
	7:00 PM the small excavator.				
	Bruce vongroven continued prpparaing equipment for tomorrows tine				
	sled deployment.				
	Fabricated attachment for cable counter device and installed				
	shieve on bucket of excavator to direct the time sled				
	Mixed enough carbon to double dose the second pull if needed.				
	Carbon will be soaked for 24 hours prior to deployment.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**27-Sep-06**	**Wednesday**	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO. **13**	
CONTRACTOR **Tetra Tech FW, Inc.**	TtECI Project Manager **Ray Mangrum**		
AM WEATHER **partly cloudy**	PM WEATHER **pertly cloudy**	Precip. rain last night **0**	MAX TEMP (F) **72** / MIN TEMP (F) **41**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0515	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Discussed procedures for to day while deploying carbon utilizing the	Bruce Vongroven	Brennan	Safety/Mech.	10
	tine sled	Steve Stroschein	Brennan	Safety/Mech.	10
	Meeting with TT/Brennan/BBL/Anchor and Alcoa to discuss reporting	Kevin Schuldt	Brennan	mech/deck hand	10
	procedures and task management. Communication for Brennan crew will	Rich Tischer	Brennan	excavator operator	10
	run through Tetra Tech.	Kenny Manning	Brennan	Engineer	10
	Crew departed SLSDC to go up river and begin preparation for carbon	Chris Mayette	Brennan	operator/deckhand	10
	deployment utilizing the tine Sled.	Rod Smith	Brennan	Crane Operator	10
	Target time to deploy carbon was set for 10:30 AM	James Dunkley	Brennan	GPS/Surveying	10
	Completed one 80' pull and started the second pull with double dose, nozzles plugged	**plugged**		total hour from cont. sheet	48

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	158
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	1,814.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	1,972.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME'
	Continue training of visitors	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used

Schedule Activity No.	Remarks
	The first run of the tine sled went as planned, no problems with guiding the sled or problems with the sled sinking in the sediments
	The crane had a line load of 500 pounds throughout the entire pull indicating no sinking or gouging of the sediments
	On the second pull, while we were deploying a double dose of carbon, we noticed that we were getting back pressure on the feed pump
	the operation was shut down after approximately a 20' pull and the tine sled was removed form the water. Over half of the injection nozzles
	were plugged. While cleaning we found one lead shot, one rock and one piece of grass.

Donald Ray Mangrum 27-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | **REPORT NUMBER** 13 | **DATE** 27-Sep-06

ALCOA GAC PROJECT | **Wednesday**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION		EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	10
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed Emergency procedures and fire training	Tony Binsfeld	Brennan		8
	7:30 AM	Performed rigging and equipment inspections				48
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:45 AM	Team meeting with T/Brenna/ Alcoa/Anchor and BBL to discuss communications				
		for the remainer of the project. All direction will run through Tetra Tech.				
		Discussed plan for the day and contingencies if things change.				
	8:30 AM	Prepared for weekly meeting with project team. Brennan crew prepared				
		the marrine plants for todays activities. Decided not to install the cable counter				
		prior to the first pull. We will mark the ccable and time it during the operations				
	10:30 AM	Rodger call and informed us that they would be ready for the first pull				
		at approximately 11:00 AM. We viewed the pull from the land viewing				
		area. The first pull went very smooth.				
	11:20 AM	Talked with Rodger and inform him that since the pull went well let mount				
		the cable counter and begin the second pull as soon as BBL finished sampling.				
	12:20 PM	Rodger and Kenny call and wanted to meet with me to discuss the second				
		pull. They would like to make the second pull without the cable counter				
		since they have a good way to measure it progress. We conclude that we				
		should perform the second pull without the cable counter and Brennan would				
		begin resetting the marine plants once BBl completes the sampling.				
	3:00 PM	Began the second pull, after 20 lf of pulling we discovered that the pump				
		was getting back pressure indicating blockage in the system. We stop the				
		pull and removed the tine sled and discovered that over half of the nozzles were				
		plugged.				
	3;00 6:00	Unplugged the nozzles and kept two opeators on site to perform a demostration				
		for the visitors.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE **28-Sep-06** **Thursday**

REPORT NO. **14**

CONTRACT NO.	TITLE AND LOCATION
MSA	**ALCOA GAC PROJECT**

CONTRACTOR	TtECI Project Manager
Tetra Tech FW, Inc.	**Ray Mangrum**

AM WEATHER	PM WEATHER	Precip.	MAX TEMP (F)	MIN TEMP (F)
clear to cloudy	**cloudy rain beginning at 2:30 PM**	**<.5 inches**	**66**	**55**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Discussed procedures for to day, task include completing the installation	Bruce Vongroven	Brennan	Safety/Mech.	10
	of the 300 LF of turbidity Curtain and making two runs with the tine sled	Steve Stroschein	Brennan	Safety/Mech.	6
	Crew departed SLSDC property at 0730 to begin deploying the turbidity curtain	Kevin Schuldt	Brennan	mech/deck hand	10
	Once turbidity curtain was completed, Crew set up for the second sled run	Rich Tischer	Brennan	excavator operator	10
	using a double dose of carbon, this was accomplished by adding an	Kenny Manning	Brennan	Engineer	10
	additional sheive on the crane which reduced the pull rate by half	Chris Mayette	Brennan	operator/deckhand	10
	Made the third pull with single dose of carbon	Rod Smith	Brennan	Crane Operator	10
	at 1530 to crew began to stabilize the marine plants and remove sled from	James Dunkley	Brennan	GPS/Surveying	10
	water.			total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	136
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**1,972.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**2,108.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Weekly safety meeting with project team. Dan Casey, Bill Moon, Ray Mangrum, and Bill	
	Welch attended the meeting. Gerg Rutherford was conferenced in but stayed only a few	
	minutes.	
	Concerned with the pulling our safety professional from the project to perform training for	
	visitors. We need to keep our safety personnel onsite as much as possible.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		no materials of equipment received today

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)			Hours used
		See next page for description.			

Schedule Activity No.	Remarks
	The first run of the tine sled went as planned, no problems with guiding the sled or problems with the sled sinking in the sediments
	The crane had a line load of 500 pounds throughout the entire pull indicating no sinking or gouging of the sediments
	On the second pull, while we were deploying a double dose of carbon, we noticed that we were getting back pressure on the feed pump
	the operation was shut down after approximately a 20' pull and the tine sled was removed form the water. Over half of the injection nozzles
	were plugged. While cleaning we found one lead shot, one rock and one piece of grass.

Donald Ray Mangrum 28-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 14 | DATE 28-Sep-06

ALCOA GAC PROJECT | Thursday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed proper use of PPE and disposal of contaminates	Tony Binsfeld	Brennan		0
	7:30 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	8:00 AM	Crew moved marine plant #2 to continue deploying the turbidity curtain.				
		The two 100 lF sections were install and spliced within the first hour of operations				
		The last 100LF required the deployment of anchors. Anchors were set and the				
		final 100 LF was completed at 1100.				
	11:00 AM	Moved marine plant #2 back to the test area for the second pull of the				
		tine sled using a double dose. The marine plant had to be positioned and				
		surveyed to ensure proper placement of the tine sled.				
		Once the marine plants were inplace, each marine plant had to be surveyed				
		and the pull location marke on both marine plant #1 and #2.				
		The crew installed the extra float to the tine sled and then placed the sled into				
		the water. The additional float made the sled float so it had to be removed.				
	12:30 PM	The sled was placed into the water and positioned for the second pull using				
		a double dose of carbon. The shieve was installed on the crane which reduced				
		the pull speed in half. We were able to deploy the required 25 GPM of carbon				
		slurry while running the sled at half speed creating a double dose.				
		This pull was completed at 1330 and the sled was repositioned for the third				
		pull using a single dose of carbon.				
	2:00 PM	The third pull began and was completed at approximately 1530.				
		Crew called to see what the next move was to be. I informed them to begin				
		securing the marine plants and shut down operations for the day.				
		The sled was removed and placed into the secondary containment.				
	4:30 PM	Crew arrived at SLSDC property and made sure the radios were plugged in				
		for tomorrows operations.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**29-Sep-06**	**Friday**	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO. **15**	
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **cloudy and raining**	PM WEATHER **Cloudy and light drizzle**	Precip. **trace**	MAX TEMP (F) **52** / MIN TEMP (F) **43**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Tetra Tech, Brannan, BBI and Alcoa discussed the paln of the day.	Bruce Vongroven	Brennan	Safety/Mech.	10
	The plan was based on information gathered from the previous days sample	Steve Stroschein	Brennan	Safety/Mech.	0
	results. The carbon deployment to date shows no carbon at 0-6-inches.	Kevin Schuldt	Brennan	mech/deck hand	10
	Discussed measures to ensure we were deployimg carbon at the	Rich Tischer	Brennan	excavator operator	10
	correct elevations.	Kenny Manning	Brennan	Engineer	10
	While Brennan lowere the roto-tiller, BBI will record the images to ensure	Chris Mayette	Brennan	operator/deckhand	10
	we are deploying at the correct elevations.	Rod Smith	Brennan	Crane Operator	10
	Our first foot pint indicated that we were delpoying at approximately	James Dunkley	Brennan	GPS/Surveying	10
	1-foot lower than the targeted depth			total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k**	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	130
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**2,108.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**2,238.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Still need to put up sinage on the marine plants	
	Wet site conditions, slip trip and fall	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		no materials of equipment received today

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Slow progress to due to verfying the carbon was being deployed at the correct elevations.

Donald Ray Mangrum 29-Sep-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 — **REPORT NUMBER** 15 — **DATE** 29-Sep-06

ALCOA GAC PROJECT — **Friday**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed proper use of PPE and disposal of contaminates	Tony Binsfeld	Brennan		0
	7:30 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:15 - 8:00	Project Team leaders met to discuss the plan of the day. The following personnel				
		attended the Meeting: Ray Mangrum, Bill Welch, Bruce Cook, Dan Casey,				
		Rodger Bean, Kenny Manning, Bruce Vongroven, Rick Tischer, Heather				
		VanDewalker, Ron Kuhn and James Dunkley.				
	8:30 AM	Brennan positioned the marine plants for todys opeation. As discussed in the				
		morning meeting, staff gauges were added to the roto tiller to video its position.				
		First we used the push pole with plate attached to determine the top of sediments				
	11:00 AM	BBL used their camera to record the push pole being placed into the water and				
		where it contacted top of sediments. BBL recoded depth of water to top of				
		sediments and Brennan adjusted the position of the roto-tiller 1 1/2 foot above				
		the new sediment mud line. Carbon was inject into the roto-tiller with mixers off,				
		BBL recorded the carbon being deployed.				
	12:00 PM	The second foot print was set .3 foot above the new mud line as determined				
		by Brennan and BBL. As with the first foot print BBL video the process.				
		This foot print was single doxe with mixers on				
	1:00 to 4:0(	Continue with the plan of the day. Three foot print were set .3 above new				
		mud line and sngle dose of carbon was injected with mixers on. The next				
		three foot print were set at the same elevation and injected with carbon				
		at a double dose and mixers on. The five final area were completed with				
		the roto-tiller setting at the same elevations but the mixers were not on, three				
		of the foot prints received single dose and two received a double dose of				
		carbon.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	02-Oct-06	Monday			
CONTRACT NO. MSA	TITLE AND LOCATION ALCOA GAC PROJECT			REPORT NO.	16
CONTRACTOR Tetra Tech FW, Inc.		TtECI Project Manager Ray Mangrum			
AM WEATHER partly cloudy	PM WEATHER clear to partly cloudy	Precip.	none	MAX TEMP (F) 66	MIN TEMP (F) 46

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Crew travel to project site	Bruce Vongroven	Brennan	Safety/Mech.	10
	Set up marine plants at the owners option area of the test area	Steve Stroschein	Brennan	Safety/Mech.	0
	Remove and replace the encoder on the tiller	Kevin Schuldt	Brennan	mech/deck hand	10
	Machine back in operaations by 1300, after calibrating the encoder	Rich Tischer	Brennan	excavator operator	10
	13:00 began carbon deployment in owners option area of the test area	Kenny Manning	Brennan	Engineer	0
	Completed 8 foot prints, all double mixed, first four foot print were 3 tenths	Chris Mayette	Brennan	operator/deckhand	10
	above new mud line, second four were 2 tenths above new mud line.	Rod Smith	Brennan	Crane Operator	10
	Set up marine plants at mix area for tomorrows deployment operations	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	2,238.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	2,358.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Repaired stairs leading to floating barge at SLSDC slip	
	Continue inspecting site for safety issues	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Brennan picked up extra gloves, rain coats and tools for the project

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Tt, BBL, CDM, Alcoa and QUE had a meeting at 5:00 pm to discuss sample results..
	From this meeting we decided to begin deploying carbon in the mixed area.

Donald Ray Mangrum 02-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 16 | DATE 2-Oct-06

ALCOA GAC PROJECT | Monday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION		EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed proper use or handling of drums	Tony Binsfeld	Brennan		0
	7:30 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:45 AM	Arrived at marine plants. Begin moving the marine plants into position				
		for carbon deployment with the oweners option area of the test area.				
	9:15 AM	Both marine plants are inplace and ready for deployment once Alcoa gives the				
		go ahead.				
	9:30 AM	Removed the encoder on the roto-tiller. Wires were removed form the boom				
		and disconnect for the inboard computer.				
		The new encoder was installed and the wires were reattached to the excavator				
		boom and the on board computer.				
	12:30 PM	Calibrate the newly installed encoder				
	1:00 PM	begin deploying carbon on the owners options of the test area				
		TU1-N4, TU1-N5, TU2-N5 and TU2-N4 were mixed with double dose of				
		carbon at 3 tenths above new mud line.				
		TU3-N4, TU3-N5, TU4-N5 and TU4-N4 were mixed with double dose of				
		carbon at 3 tenths above new mud line.				
	3:30 PM	Completed the eight area for today				
	3:45 PM	Move the marine plants to the mix area starting upstream and working down				
		stream				
	4:45 PM	Crew completed days wrok and traveled back to SLSDC site.				
	5:00 PM	crew went back to the motel				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**03-Oct-06**	**Tuesday**		
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT NO. **17**	
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **cloudy and rain**	PM WEATHER **clear to partly cloudy**	Precip. **trace in am**	MAX TEMP (F) **71**	MIN TEMP (F) **46**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Crew travel to project site	Bruce Vongroven	Brennan	Safety/Mech.	10
	Set up marine plants in the mix area,	Steve Stroschein	Brennan	Safety/Mech.	0
	Reposition marine plant to exclude the first set of foot prints	Kevin Schuldt	Brennan	mech/deck hand	10
	began mix area carbon deployment at 10:00 AM	Rich Tischer	Brennan	excavator operator	10
	Completed 20 foot prints	Kenny Manning	Brennan	Engineer	0
	Nozzles problems on two foot prints, nozzles had to be cleaned	Chris Mayette	Brennan	operator/deckhand	10
	Continued manual sounding to verify new mud line	Rod Smith	Brennan	Crane Operator	10
	BBL performed a qualitity check on our manual sounding procedures.	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**2,358.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**2,478.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Safety Audit for Alcoa Greg Rutherford	
	4 action item noted and three have been completed, ordered lables for the forth.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Tetra Tech attended the 5:00 Pm meeting, Meeting was complete ar 6:25 PM

Donald Ray Mangrum — 03-Oct-06

CONTRACTOR/SUPERINTENDENT — DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | **REPORT NUMBER** 17 | **DATE** 3-Oct-06

ALCOA GAC PROJECT | Tuesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed proper use or handling of drums	Tony Binsfeld	Brennan		0
	7:30 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:45 AM	Had to reposition marine plant first thing this morning. It was 10:00 AM before				
		we began deploying carbon				
	10:00 AM	Work on mix area, began opeations at MAU2-N11				
		Each foot print is averaging about 18 minutes per foot print.				
		Completed the 20 foot prints by 4:15 PM.				
		Nozzles problems on MAU2-N5 and MAU3-N11				
		At noon while deploying carbon in MAU2-N5 we experienced back				
		pressure on the pump indicating plugging in the system				
		The roto-tiller was removed and found 4 nozzles plugged.				
		The nozzles were unplugged and operations conitnued at 1300				
		The next foot prints went well until we got the the last one for the day,				
		we experienced pluggging again. The roto-tiller was removed and the nozzles				
		will be cleaned in the morning.				
	4:15 PM	Crew shut down and secured the marine plants				
	4:45 PM	travel from marine plants to SLSDC				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**04-Oct-06**	**Wednesday**		
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT NO.	**18**
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **Cloudy**	PM WEATHER **Cloudy light rain**	Precip. **trace in pm**	MAX TEMP (F) **63**	MIN TEMP (F) **55**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Crew travel to project site	Bruce Vongroven	Brennan	Safety/Mech.	10
	Crew began clearing nozzles of the roto-tiller, All flex hoses were removed	Steve Stroschein	Brennan	Safety/Mech.	0
	and cleaned, each nozzle were cleaned, Lifted the roto-tiller and sprayed	Kevin Schuldt	Brennan	mech/deck hand	10
	clean water through it to ensure each nozzle were working correctly.	Rich Tischer	Brennan	excavator operator	10
	Completed the first two area where BBL wanted to take their samples.	Kenny Manning	Brennan	Engineer	0
	Moved the operation to the other end of the marine plant so BBL could	Chris Mayette	Brennan	operator/deckhand	10
	access the sample locations without interfering with the mixing operations	Rod Smith	Brennan	Crane Operator	10
	Nozzles began to show signs of plugging at MAU4-N3, Remove tiller and cleaned	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k**	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**2,478.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**2,598.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Review of safety audit	
	Completed action items identified in safety audit	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks

Donald Ray Mangrum (signature) 04-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 18 | DATE 4-Oct-06

ALCOA GAC PROJECT | Wednesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed Alcoa safety audit and findings.	Tony Binsfeld	Brennan		0
	7:30 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
		Project team leaders remained at SLSDC property to discuss plan of the day.				
		We want to make sure the nozzles are clean and inspected				
		We need to add additional water to the makeup to reduce percent soilds				
		Perform nozzle inspection at least twice per day				
		Reviewed the need to position the marine plant were BBL can sample				
		close behind our operations.				
		Increase the RPM's of the roto-tiller to 12-15 RPMS				
		Tow row of mixing foot prints are scheduled today, the first row will be mixed,				
		3 tenths above mudline, higher RPM's, the second row will be mixed,				
		3 tenths above mudline, higher RPM's, rotatoe tiller 90 degrees and mix				
		for another three minutes.				
		Our first two area will be MAU4-N2 and MAU5-N2, the first area will be mixed				
		at the higher RPM's and the second foot print will be mixed the same, but				
		the roto-tiller will be rotated 90 Degrees and repositioned on the foot print				
		and mixed another 3 minutes.				
	7:45 to 4:45	Completed the first two areas so BBL could pull samples				
		Moved to other end of the row and began mixing the foot prints				
		Just after noon we encountered nozzle plugging again, cleaned and resumed				
		operations.				
		At the end of operation we inspected the nozzles and found 4 plugged.				
		Unplugged nozzles and repositioned the marine plant for tomorrow operations.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	05-Oct-06	Thursday	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT NO. 19
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**	
AM WEATHER **Clear and cold**	PM WEATHER **Clear and mild**	Precip. 0	MAX TEMP (F) 53 / MIN TEMP (F) 37

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the problems with nozzles plugging	Bruce Vongroven	Brennan	Safety/Mech.	10
	Bruce is working on ways to mitigate the problem or ways to reduce	Steve Stroschein	Brennan	Safety/Mech.	0
	cleaning time of the nozzles	Kevin Schuldt	Brennan	mech/deck hand	10
	Rodger and three crew member brought marine plant#1 back to SLSDC	Rich Tischer	Brennan	excavator operator	10
	to offload the excavator and tine sled. They also assisted in offloading	Kenny Manning	Brennan	Engineer	0
	the anchors used by the contractor working in the St. Lawrence River	Chris Mayette	Brennan	operator/deckhand	10
	Marine plant #1 was out of the mix area from 7:45 to 12:30	Rod Smith	Brennan	Crane Operator	10
	Marine plant #2 was positioned yesterday so production would not be	James Dunkley	Brennan	GPS/Surveying	10
	interupted while marine plant #1 was at SLSDC Property.			total hour from cont. sheet	30

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	2,598.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	2,718.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Propoer labing of containers	
	Review of BBL audit conducted by Alcoa.	
	Bill Welch is completing the action items noted on the Alcoa Audit.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Data review meeting at 5:00 P.M.

CONTRACTOR/SUPERINTENDENT	DATE 05-Oct-06
Donald Ray Mangrum	

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 19 | DATE 5-Oct-06

ALCOA GAC PROJECT | Thursday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed Alcoa safety audit and findings.	Tony Binsfeld	Brennan		0
	7:30 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:45 AM	Marine plant # 1 was mavoed back to the SLSDC site to offload the excavator				
		and tine sled. While at the SLSDC property, Brennan's crew off loaded the				
		anchors used by another contractor working in the St Lawrence River.				
		Marine plant #1 was returned to the mix area site at 12:30 PM.				
	8:40 AM	Nozzles on the roto-tiller were unplugged and the rot-tiller was positioned into				
		the first foot print to deploy carbon				
		After the 4 foot print, the roto-tiller was removed from the water and the nozzles				
		checked. 7 nozzles were found plugged, they were cleaned and production				
		resumed. After six foot prints were completed, the roto-tiller was remove again				
		and the nozzles cleaned, 4 were plugged this time.				
		After completing the first ten foot prints, Alcoa instructed us to reduce the				
		speed of the roto-tiller, speed was reduced to approximately 5-7 RPM's				
		Completed the next five foot prints and then removed the roto-tiller to inspect				
		the nozzles, 4 were found plugged, they were cleaned and production resumed.				
		Completed the next five foot prints and once again the roto-tiller was removed so				
		the nozzles could be checked, 5 nozzles were found plugged.				
		Bruce Von Groven has been working on ways to mitigate the plugging issue.				
		The carbon is being screened, but these batches were previously prepared.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	06-Oct-06	Friday	
CONTRACT NO. MSA	TITLE AND LOCATION ALCOA GAC PROJECT	REPORT NO. 20	
CONTRACTOR Tetra Tech FW, Inc.	TtECI Project Manager Ray Mangrum		
AM WEATHER Clear and cold	PM WEATHER Clear and mild	Precip. 0	MAX TEMP (F) 53 / MIN TEMP (F) 32

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the problems with nozzles plugging	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Crew began deploying carbon at MAU8-N8 and completed 20 foot prints	Kevin Schuldt	Brennan	mech/deck hand	10
	James received a copy of the software needed to perform the suvey of	Rich Tischer	Brennan	excavator operator	10
	the three previous tine sled pull locations.	Kenny Manning	Brennan	Engineer	0
	After down loading the info, additional saftware was needed, he has arranged	Chris Mayette	Brennan	operator/deckhand	10
	for an overnight delivery for the needed software.	Rod Smith	Brennan	Crane Operator	10
	Crew shutdown at 2:30 to secure the site for the weekend.	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	2,718.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	2,838.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Working in clod weather	
	Potential of ice forming on the marine plants	
	Complete documentation of operators training certificates	
	Use sand to reduce slip hazards on marine plants	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Received 6 pallets of carbon furnished by Alcoa @ 8:00 AM

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Data review meeting at 3:00 P.M.

Donald Ray Mangrum 06-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 20 | DATE 6-Oct-06

ALCOA GAC PROJECT | Friday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed Alcoa safety audit and findings.	Tony Binsfeld	Brennan		0
	7:30 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:45 AM	Crew departed SLSDC property and traveled to the work site				
		Crew unplugged twon nozzles and began deploying of the carbon.				
		Deployment was still 3-tenths above new mudline, low RPM's 5-7, 4 minute				
		settling time and continued checking nozzles after the fifth foot print				
		was completed. Still having minor problems with nozzles plugging.				
		After the fifth foot print we found only 1 nozzle plugged, after the next five				
		no nozzles were plugged, after the next five two nozzles were plugged and two				
		plugged at completion.				
		Bruce continued screening the carbon prior to adding it into the mix buckets.				
		Several item were screened out.				
		Crew completed 20 foot prints today and shut the operation down at 1430				
		Crew began securing the site for the weekend.				
		Crew departed the SLSDC at 1500 for the weekend.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT DATE **09-Oct-06** **Monday** REPORT NO. **21**
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**	
AM WEATHER **clear and mild**	PM WEATHER **Partly cloudy and warm**	Precip. **0**	MAX TEMP (F) **75** / MIN TEMP (F) **49**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Crew departed SLSDC @ 0745 to go upriver and to begin deploying carbon	Kevin Schuldt	Brennan	mech/deck hand	10
	First foot print was started at 0810 and by 1100 12 foot prints were completed	Rich Tischer	Brennan	excavator operator	10
	After the 12th foot print, the tewm noticed that approximately 5 nozzles were	Kenny Manning	Brennan	Engineer	0
	plugged. The roto tiller was removed for the river and the nozzles cleaned.	Chris Mayette	Brennan	operator/deckhand	10
	Completed 27 foot prints as planned. Crew repositioned the marine plants	Rod Smith	Brennan	Crane Operator	10
	for tomorrows work. Carbon was prepared for roto-tiller application	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	2,838.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	**2,958.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Re focus on safety as the project is closing	
	Acknowledge the forklift operators for passing the written exam.	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Excellent production day, 27 foot prints completed by 1500.

Donald Ray Mangrum   09-Oct-06

CONTRACTOR/SUPERINTENDENT   DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER 21

DATE 9-Oct-06

ALCOA GAC PROJECT

Monday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed refocusing on safety after the weekend.	Tony Binsfeld	Brennan		0
	7:40 AM	Performed rigging and equipment inspections				30
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
	7:25 AM	Crew departed SLSDC property and traveled to the work site				
		Production goals were established in the morning meeting, our goal for				
		today was 27 foot prints and reposition marine plants for tomorrows work.				
		Crew began operation on MAU10-N8 and proceed on the 10 column until				
		the column was completed, moved to cloumn 11 and proceed to MAU11-N6,				
		after MAU11-N6 the roto-tiller was checked and the crew found 5 plugged				
		nozzles. The nozzles were celaned and work continued on column 11.				
		After column 11 was complete, the crew moved to column 12 and completed the				
		ten foot prints in that column.				
		Rodger call at 1500 and informed me that they completed the 27 foot prints				
		scheduled for today. The crew was instructed to reposition the marine plants				
		for column 1 work tomorrow.				
		The marine plants are positioned to begin deploying carbon in column 1.				
		Carbon was prepared for the ten columns remaining for the mix area column 1				
		and enough to get started in the unmix area. A minimum of ten batches were				
		prepared for the unmixed area.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**10-Oct-06**	**Tuesday**		
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT NO. **22**	
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **Partly cloudy and cool**	PM WEATHER **Partly cloudy and mild**	Precip. **0**	MAX TEMP (F) **53**	MIN TEMP (F) **43**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Crew departed SLSDC @ 0745 to go upriver and to begin deploying carbon	Kevin Schuldt	Brennan	mech/deck hand	10
	Rodger met Perras to show where to drop the trailer for the anchors	Rich Tischer	Brennan	excavator operator	10
	and additional turbidity curtain.	Kenny Manning	Brennan	Engineer	4
	Completed column 1 and 13 or 20 foot prints, Mix area complete	Chris Mayette	Brennan	operator/deckhand	10
	Mixed 32 batches of coconut carbon for the unmixed roto-tiller area	Rod Smith	Brennan	Crane Operator	10
	Began removing the mixers and shafts form the roto-tiller	James Dunkley	Brennan	GPS/Surveying	10
	Marine Plant #2 loaded the excavator, mats and tine sled.			total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	124
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	2,958.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**3,082.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Changing weather conditions	
	Reviewed Alcoa incident with the rubber tire backhoe where the operator was killed	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Completed the mix area, began preparation for the unmixed area
	Took Patti Kaulback and Ann Glaude on trip to the carbon deployment operations. Toured the marine plants and discussed operation procedures.

Donald Ray Mangrum 10-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1	REPORT NUMBER 22	DATE 10-Oct-06
	ALCOA GAC PROJECT	Tuesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION		EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed changing weather, and Alcoa Incident	Tony Binsfeld	Brennan		0
	7:25 AM	Crew departed SLSDC property and traveled to the work site				30
		Production goals were established in the morning meeting, our goal for				
		today was 20 foot prints and reposition marine plants for tomorrows work.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
		on roto-tiller and excavator, nozzles inspections on roto-tiller				
	8:00 AM	Began carbon deployment in MAU1-N11 foot print. Continue up deploying				
	to	carbon in column 1. Once column was completed, the marine plants were				
	5:00 PM	repositioned for column 13 carbon deployment. After marine plant #1 was				
		positioned, Brennan moved marine plant #2 back to SLSDC property				
		to load excavator, tine sled and mats. Brennan loaded a Perrras trailer				
		with anchors and turbidity curtain that was staged at the SLSDC property.				
		Once column 13 was completed, Brennan began removing the mixing				
		system from the roto-tiller. During the carbon deployment in the unmixed area				
		Alcoa wanted the mixers removed to avoid shadowing while deploying the				
		carbon to the surface of the sediments.				
		Brennan also mixed 32 batches of the coconut carbon for the unmix				
		area utilizing the roto-mixer.Carbon will soak approximately 24 hours prior				
		to use.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**11-Oct-06**	**Wednesday**	REPORT NO.	**23**
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**			
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**			
AM WEATHER **Cloudy and rain**	PM WEATHER **Cloudy rain**	Precip. **>1.0"**	MAX TEMP (F) **64**	MIN TEMP (F) **49**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Crew departed SLSDC @ 0745 to go upriver and to begin deploying carbon	Kevin Schuldt	Brennan	mech/deck hand	10
	Removed mixers in roto-tiller	Rich Tischer	Brennan	excavator operator	10
	Placed carbon on 24 foot prints in unmixed area	Kenny Manning	Brennan	Engineer	10
	removed 100lf of turbidity curtain and 7 anchors, anchorw were rinsed and	Chris Mayette	Brennan	operator/deckhand	10
	place on marine plant #2	Rod Smith	Brennan	Crane Operator	10
		James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	130
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	3,082.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**3,212.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME
	Changing weather conditions	
	Continue focus on safety during closing weeks of project	

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)			Hours used
		See next page for description.			

Schedule Activity No.	Remarks
	Site visitor form Tetra Tech

Donald Ray Mangrum (signature) 11-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 23 | DATE 11-Oct-06

ALCOA GAC PROJECT | Wednesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed changing weather, and Alcoa Incident	Tony Binsfeld	Brennan		0
	7:25 AM	Crew departed SLSDC property and traveled to the work site				30
		Production goals were established in the morning meeting, our goal for				
		today was 20 foot prints and reposition marine plants for tomorrows work.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
		on roto-tiller and excavator, nozzles inspections on roto-tiller				
	8:00 AM	Bruce Von groven completed the removal of the mixers from the roto-tiller.				
	to	At 10:20 the roto-tiller was back in service. Began install carbon in				
	5:00 PM	UMU1-N8 and completed in UMU4-N1. Our production goals for today was				
		set at 24 and this was completed by 3:45PM.				
		At 3:45 PM Larry McShea instructed TtEC to stop carbon deployment using				
		the coconut based carbon. EPA will need to approve the process before we				
		continue with the coconut based carbon.				
		100 LF of turbidity curtain was removed and stacked on marine plant #2.				
		Along with removing the turbidity curtains, Brennan also removed and				
		rinsed the anchors. After rinsing, the anchors were placed on a pallet				
		fro transfer.				
		At 5:45 PM Larry McShea let me know that we have gotten the approval				
		from EPA to continue with the coconut based carbon deployment.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	12-Oct-06	Thursday	REPORT NO.	24	
CONTRACT NO. MSA	TITLE AND LOCATION ALCOA GAC PROJECT				
CONTRACTOR Tetra Tech FW, Inc.	TtECI Project Manager Ray Mangrum				
AM WEATHER Cloudy and rain	PM WEATHER Cloudy and cool	Precip. trace	MAX TEMP (F) 61	MIN TEMP (F) 53	

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Crew departed SLSDC @ 0745 to go upriver and to begin deploying carbon	Kevin Schuldt	Brennan	mech/deck hand	10
	Carbon deployment of the final column of foot prints within the unmix area	Rich Tischer	Brennan	excavator operator	10
	Completed the unmixed area with the roto-tiller (8 foot prints completed)	Kenny Manning	Brennan	Engineer	10
	Reposition the marine plants and prepare the marine plants for carbon	Chris Mayette	Brennan	operator/deckhand	10
	deployment using the tine sled. Check the elevation in three locations prior	Rod Smith	Brennan	Crane Operator	10
	to placing the sled into water, start, middle and end of sled run.	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k**	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	130
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	3,212.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**3,342.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE		[X] SAFETY REQUIREMENTS HAVE BEEN ME		

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Exhaust fumes from equipment, work in well vented area, keep engine tuned, check homes for co2 gases.
		TTEC finding that task changes and project ending are causes for concerns, this is when incidents occur.

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)			Hours used
		See next page for description.			

Schedule Activity No.	Remarks
	TTEC visitor departed Alcoa facility at 10:30 AM

Donald Ray Mangrum (signature) — 12-Oct-06

CONTRACTOR/SUPERINTENDENT — DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER	24		DATE	12-Oct-06
ALCOA GAC PROJECT				Thursday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed changing weather, and Alcoa Incident	Tony Binsfeld	Brennan		0
	7:25 AM	Crew departed SLSDC property and traveled to the work site				30
		Production goals were established in the morning meeting, our goal for				
		today was 20 foot prints and reposition marine plants for tomorrows work.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
		on roto-tiller and excavator, nozzles inspections on roto-tiller				
	8:00 AM	Continued on un-mixed area using roto-tiller, Completed 8 foot print and then				
	to	repositioned the marine plants to begin the deploying carbon using the				
	5:00 PM	tine sled. BBL was to video the first pulls to see if the tine sled was sinking				
		into the sediments, but due to mechanical problems with the BBL boat the				
		video was not available to be on loaction when we began deploying carbon				
		with the tine sled. We had Brennan take three manual elevations along				
		the sled run, one at the start, one at the middle, and one at the end of the				
		pull. After setting the tine sled into position, the elevation of the bottom of the				
		sled was checked to see if it was sinking into the soft sediments. The elevation				
		of the tine sled was checked at mid point and at the end of the pull. On the first				
		pull the tine sled sank into the sediments 0.5' and mid point is was still at 0.5' into				
		the sediments and at the end it was 0.2' into the sediments. Brennan installed				
		additional floatation on the sled and set up for pull 2. The same measuring				
		procedures were established for the second pull. As with the first pull it still				
		sank into the sediment 0.7'. The third pull averaged approximately 0.2' deep				
		into the sediments. Will continue the next pull at same buoyancy.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**		REPORT DATE **13-Oct-06** **Friday** / REPORT NO. **25**
CONTRACTOR **Tetra Tech FW, Inc.**		**TtECI Project Manager** **Ray Mangrum**	
AM WEATHER **clear and cold**	PM WEATHER **partly cloudy**	Precip. **0**	MAX TEMP (F) **50** / MIN TEMP (F) **32**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Crew departed SLSDC @ 0745 to go upriver and to begin deploying carbon	Kevin Schuldt	Brennan	mech/deck hand	10
	Carbon deployment in the final 5 sled pulls	Rich Tischer	Brennan	excavator operator	10
	BBL used the video camera to one of the pulls for documentation	Kenny Manning	Brennan	Engineer	10
		Chris Mayette	Brennan	operator/deckhand	10
		Rod Smith	Brennan	Crane Operator	10
		James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	130
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	3,342.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	3,472.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Safety and security of marine plants over the weekend and during cold weather
		Continue the focus on safety as we are nearing the project end

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks

Donald Ray Mangrum 13-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER	25

DATE	13-Oct-06

ALCOA GAC PROJECT

Friday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed changing weather, and Alcoa Incident	Tony Binsfeld	Brennan		0
	7:25 AM	Crew departed SLSDC property and traveled to the work site				30
		Production goals were established in the morning meeting, our goal for				
		today was 20 foot prints and reposition marine plants for tomorrows work.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files. Inspection of hydraulic systems				
		on roto-tiller and excavator, nozzles inspections on roto-tiller				
	8:00 AM	Removed the tine sled from the water and inspected the nozzles, found several				
	to	plugged nozzles, it took over an hour to unplug the nozzles and resume				
	5:00 PM	deploying carbon. Completed the five pulls by 2:30 PM.				
		BBL did get a video of one of the pulls.				
		Continued having problems with the nozzles with the tine sled. Twenty				
		nozzles were plugged prior to starting pull TS7, 12 nozzles were found plugged				
		prior to starting TS10 and 2 nozzles were plugged when the final pull				
		was complete.				
		Moved one marine plant back to SLSDC to begin dismanteling to prepare				
		units for demobilization.				
		The tine sled was washed and rinsed along with the tine sled				
		containment.				
		Approval was received to work on Saturday. We will continue removing				
		the turbidity curtain and continue dismantling the marine plant.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE **14-Oct-06** **Saturday**

CONTRACT NO.	TITLE AND LOCATION	REPORT NO.
MSA	**ALCOA GAC PROJECT**	**26**

CONTRACTOR	TtECI Project Manager
Tetra Tech FW, Inc.	**Ray Mangrum**

AM WEATHER	PM WEATHER	Precip.	MAX TEMP (F)	MIN TEMP (F)
cloudy and light rain	**cloudy and light rain**	**1.0"**	**37**	**37**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Split crews to multitask, crew 1 removed equipment form marine plant #1	Kevin Schuldt	Brennan	mech/deck hand	10
	and crew 2 continued removing turbidity curtain and anchors.	Rich Tischer	Brennan	excavator operator	10
	Marine plant #1 equipment removal was complete with the exception of	Kenny Manning	Brennan	Engineer	4
	the two connex boxes which will require the large crane.	Chris Mayette	Brennan	operator/deckhand	10
	Removed all turbidity curtain with the exception of the cross piece.	Rod Smith	Brennan	Crane Operator	10
		James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY				
WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	**[X] YES**	**[ ] NO**	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	124
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	3,472.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?	**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)	**[ ] YES**	**[X] NO**	TOTAL WORK HOURS FROM START OF CONSTRUCTION	**3,596.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Bad weather conditions
		Keep focus on safety during demobilization

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	

Schedule Activity No.	Remarks
	Wet cold and nasty day. Split crew so as to multitask. Crew one remained at SLSDC property and began removing equipment from
	marine plant # 1. Crew two went to the construction site and continued removing turbidity curtain.
	Both crew worked 8 hours but 2 hours were owed to the crew so 10 hours charged today.

Donald Ray Mangrum 14-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER 26

DATE 14-Oct-06

ALCOA GAC PROJECT

Saturday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed changing weather, and Alcoa Incident	Tony Binsfeld	Brennan		0
	7:25 AM	Crew departed SLSDC property and traveled to the work site				30
		Production goals were established in the morning meeting, our goal for				
		today was 20 foot prints and reposition marine plants for tomorrows work.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files.				
	8:00 AM	Crew one removed equipment from marine plant #1 and staged the equipment				
	to	for easy loading during demobilization. Small misc. equipment was removed				
	5:00 PM	and staged for loading. The marine plant was moved to the area where the				
		large equipment could be removed. The roto-tiller, tine sled, containments, and				
		6 equipment mats were offloaded and staged for loading. After the barge deck				
		was empty, the excavator was removed and staged on shore.				
		The marine plant was repositioned in the dock area and the boards were				
		removed between the flex-a floats. The deck was swept celan and then rinsed				
		using Grasse river water.				
		Crew two continued removing turbidity curtain. Five sections were removed				
		along with the anchors. Tow of the section were folded and prepared to place				
		on pallets. Three section area removed but not folede due to high winds.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**16-Oct-06**	**Monday**	REPORT NO.	**27**
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**			
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**			
AM WEATHER **clear to partly cloudy**	PM WEATHER **partly cloudy**	Precip.	MAX TEMP (F) **58**	MIN TEMP (F) **30**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Majority of the crew went up river to remove the remainder of the turbidity	Kevin Schuldt	Brennan	mech/deck hand	10
	curtain. The final curtain had 28 anchors attached. The crew removed the	Rich Tischer	Brennan	excavator operator	10
	turbidity curtain and folded in on the sectional barge, they folded the three	Kenny Manning	Brennan	Engineer	0
	remaining curtains removed Saturday and place them on the sectional barge.	Chris Mayette	Brennan	operator/deckhand	10
	Two crew members remained on SLSDC property and continued getting the	Rod Smith	Brennan	Crane Operator	10
	connex boxes ready to off load from the marine plant.	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k**	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**3,596.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**3,716.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Standing up in moving crew boats, inspection of all equipment used and proper labling for fuel cans.
		Keep focus on safety during demobilization
		Nothing changes as for a safety no that we are in the demobilization phase of the pr

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	
		Perras delivered a float to load Alcoa equipment and materials.	

Schedule Activity No.	Remarks
	River work at the test area was completed at 1:30 PM, the curtain and anchors was removed, rinsed and loaded on the marine plant.
	Crew began removing equipment from marine Plant #2.

Donald Ray Mangrum 16-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 27 | DATE 16-Oct-06

ALCOA GAC PROJECT | Monday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed changing weather, and Alcoa Incident	Tony Binsfeld	Brennan		0
	7:25 AM	Crew departed SLSDC property and traveled to the work site				30
		Production goals were established in the morning meeting, our goal for				
		today was 20 foot prints and reposition marine plants for tomorrows work.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files.				
	8:00 AM	Majority of the crew went up river to complete the removal of the turbidity				
	to	curtain. By 1:30 PM the curtain and anchors were removed, rinsed and loaded				
	5:00 PM	on the marine plant and brought back to SLSDC to off load.				
		Perras devilered a 40'flat bed to load the turbidity curtain and other misc.				
		materials on. Materials loaded on the Perras truck is the property of Alcoa.				
		This will included, turbidity curtain, anchors, boom, and 8 oaks equipment				
		timbers. Two loads will be the property of Perras, this includes the two				
		sectional barges rented by Brennan from Perras.				
		After marine plant #2 arrived at the SLSDC property, the crew began removing				
		equipment and supplies. The turbidity curtain was loaded on plallets and				
		then loaded on the Perras trailer. Once the turbidity curtains were loaded, the				
		two sectional barges rented from Perras was disassembled and prepared for				
		loading on Perras lowboy trail tomorrow.				
		The truck crane was offladed from marine plant #2 and used to load the				
		Perras trailer. Other equipment such as the small excavator was off loaded				
		and prepared for shipping off site tomorrow. Tomorrow loads included the two				
		sectional barges rented from Perras, load of turbidity curtain, load of anchors				
		two excavators and one load of equipment mats.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT DATE **17-Oct-06** **Tuesday**	REPORT NO. **28**
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**		
AM WEATHER **cloudy**	PM WEATHER **cloudy/rain/cold/wet**	Precip. **trace**	MAX TEMP (F) **51** / MIN TEMP (F) **43**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Continue offloading marine plant #2. Turbidity curatin loaded on Perras truck	Kevin Schuldt	Brennan	mech/deck hand	10
	and transferred to Alcoa Facility. The two excavators were shipped out	Rich Tischer	Brennan	excavator operator	10
	today. The two sectional barges rented from Perras were loaded and shipped	Kenny Manning	Brennan	Engineer	0
	off site today. Anchor, carbon and misc. materials were loaded on Perras	Chris Mayette	Brennan	operator/deckhand	10
	truck and sent to Alcoa facility. One load of equioment mats were loaded	Rod Smith	Brennan	Crane Operator	10
	on Perras truck and shipe to Alcoa Facility.	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	30

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	120
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	3,716.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	3,836.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Keep focus on safety during demobilization
		Hand safety, caught between, struct by, Use gloves and hand protection

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	
		Equipment and material removed today	
		Komatsu 160 excavator returned today	
		Case 240CX ecavator returned today	
		Parres hauled one load of turbidity curtains	
		one load anchors, one load equipment mats and two loads	
		of sectional barges one to the load.	

Schedule Activity No.	Remarks
	River work at the test area was completed at 1:30 PM, the curtain and anchors was removed, rinsed and loaded on the marine plant.
	Crew began removing equipment from marine Plant #2.

Donald Ray Mangrum 17-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 28 | DATE 17-Oct-06

ALCOA GAC PROJECT | Tuesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
			Jay Wise	Brennan	GPS/SURVEYING	0
			Greg Smith	Brennan	GPS/SURVEYING	0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and	Gearld Kinsley	Brennan	GPS/SURVEYING	0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	10
		the hazards. Discussed changing weather, and Alcoa Incident	Tony Binsfeld	Brennan		0
	7:25 AM	Crew departed SLSDC property and traveled to the work site				30
		Production goals were established in the morning meeting, our goal for				
		today was 20 foot prints and reposition marine plants for tomorrows work.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files.				
	8:00 AM	Continued demobilization. Today's activities included the removal of equipment				
	to	and materials that would remain with Alcoa. The following list of material were				
	5:00 PM	shipped to Alcoa on Perras trucks.				
		All Turbidity Curtain				
		All Anchors				
		Asorbent Boom				
		Carbon 50 lbs bags and super sacks				
		one load of equipment mats, (8 mats)				
		Four loads were shipped off site				
		Case 240CX excavator- Brennan Yard				
		Kamatsu 160 excavator-Water town (rental excavator)				
		Sectional barge - Perras				
		Sectional barge - Perras				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE **18-Oct-06**	**Wednesday**			
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO. **29**		
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager** **Ray Mangrum**			
AM WEATHER **cloudy**	PM WEATHER **Cloudy**	Precip. **0**	MAX TEMP (F) **59**	MIN TEMP (F) **55**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Steve Stroschein	Brennan	Safety/Mech.	0
	Focus on safety during the demobilization phase of the project.	Kevin Schuldt	Brennan	mech/deck hand	10
	Crew prepared to laod eight flex=a-floats and misc. equipment.	Rich Tischer	Brennan	excavator operator	10
	DOT permit was issued to the driver taking the 240CX excavator, this driver	Kenny Manning	Brennan	Engineer	0
	departe SLSDC at 0730. Three truck arrived at 0730 for the flex-a-floats.	Chris Mayette	Brennan	operator/deckhand	10
	At 0930 five additional trucks arrived for flex-a-floats. The final tuck arrived	Rod Smith	Brennan	Crane Operator	10
	after lunch and was loaded with Brennan equipment.	James Dunkley	Brennan	GPS/Surveying	10
				total hour from cont. sheet	22

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi k	[X] YES	[ ] NO	TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS	112
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	[ ] YES	[X] NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	3,836.00
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		[X] YES	[ ] NO		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		[ ] YES	[X] NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	3,948.00

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	[X] SAFETY REQUIREMENTS HAVE BEEN ME

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		High winds when loading flex-a-floats
		One man given direction to the crane operator
		Truck traffic on site
		Escorts for trucks and keeping drivers in the trucks

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	
		Equipment and material removed today	
		8 flex-a-floats all apuds and spud wells and pins (8 loads)	
		Cabin for tug, 2 brennan floats, large crew bost and trailer,	
		single mixer unit, double mixer unit and wacker generator (1) load	
		Survey and positioning equipment removed today	
		TOTAL of 9 loads removed today	

Schedule Activity No.	Remarks
	River work at the test area was completed at 1:30 PM, the curtain and anchors was removed, rinsed and loaded on the marine plant.
	Crew began removing equipment from marine Plant #2.

CONTRACTOR/SUPERINTENDENT	DATE 18-Oct-06
Donald Ray Mangrum	

CONTINUATION PAGE FROM SHEET 1

REPORT NUMBER 29

DATE 18-Oct-06

ALCOA GAC PROJECT

Wednesday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.		WORK LOCATION AND DESCRIPTION	EMPLOYER	COMPANY	TRADE	HRS
						0
						0
			Cyril Mohn	Brennan	Tow Boat pilot/Operator	10
			Anthony Moselle	Brennan	Laborer	10
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				0
		and hazards associated with the task at hand, discussed ways to mitigate	James Wayering	Brennan	local deck man	2
		the hazards. Discussed changing weather, and Alcoa Incident				0
	7:25 AM	Crew worked at SLSDC property loading turcks with equipment and supplies.				22
		Production goals were established in the morning meeting,				
		Estimated that a minimum of 8 truck will arrive today.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files.				
	8:00 AM	Loaded 9 trucks today with equipment and flex-a-floats.				
	to	Crew continued working in the SLSDC property to prepare for tomorrows				
	5:00 PM	trucks. We are expecting 10 or 11 trucks tomorrow. This should leave				
		only one misc. load for Friday morning. Demobilization is still on schedule and				
		all equipment and personnel should be gone by Friday afternoon.				
		TtEC began demobilization of the office area. The conference room furniture				
		was broken down and staged in the corner of the conference room. The Anchor				
		office was cleaned and office equipment was placed in the conference room.				
		The shelves in the reception area were moved to the Anchor office and				
		supplies restacked on the bins. Two file cabinets were placed in the Anchor				
		conference room for storage.				

CONTRACTOR PRODUCTION REPORT

Prepared For Alcoa, Inc.

REPORT DATE	**19-Oct-06**	**Thursday**	
CONTRACT NO. **MSA**	TITLE AND LOCATION **ALCOA GAC PROJECT**	REPORT NO.	**30**
CONTRACTOR **Tetra Tech FW, Inc.**	**TtECI Project Manager Ray Mangrum**		
AM WEATHER **cloudy**	PM WEATHER **Cloudy/light rain**	Precip. **trace**	MAX TEMP (F) **59** / MIN TEMP (F) **53**

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION	EMPLOYER NAME	COMPANY	TRADE	HRS ng
	Arrived onsite at 0615	Ray Mangrum	TTEC	sr. project manager	10
	Travel to SLSDC property for morning safety briefing	Bill Welch	TTEC	Health & Safety	10
	Safety meeting conducted from 0700 to 0730	Roger Bean	Brennan	site supervisor	10
	Meeting with crew to discuss the remainder of the project schedule	Bruce Vongroven	Brennan	Safety/Mech.	10
	and discuss plan of the day.	Cyril Mohn	Brennan	Safety/Mech.	10
	Focus on safety during the demobilization phase of the project.	Kevin Schuldt	Brennan	mech/deck hand	10
	Crew continue demobilization of equpment. No trucks showed up until	Rich Tischer	Brennan	excavator operator	10
	0930. Completed laoding 7 trucks and we have two waiting for the morning.	Anthony Moselle	Brennan	Laborer	10
	Five more laods will complete the demobilization.	Chris Mayette	Brennan	operator/deckhand	10
	3 flex-a-floats	Rod Smith	Brennan	Crane Operator	10
	2-Brennan materials	James Dunkley	Brennan	GPS/Surveying	0
				total hour from cont. sheet	

JOB SAFETY	**WAS A JOB SAFETY MEETING HELD THIS DATE? (IF YES attach copy of the meeting mi** k	**[X] YES**	**[ ] NO**	**TOTAL WORK HOURS ON JOB SITE THIS DATE, INCL CON'T SHEETS**	100
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (IF yes Attach Copy of Completed OSHA Report)	**[ ] YES**	**[X] NO**	**CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT**	**3,948.00**
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLDING/HV ELC./HIGH WORK/HAZMAT WORK DONE?		**[X] YES**	**[ ] NO**		
WAS HAZARDOUS MATERIALS/WASTE RELEASED INTO THE ENVIRONMENT (if YES attach description of incident and proposed action)		**[ ] YES**	**[X] NO**	**TOTAL WORK HOURS FROM START OF CONSTRUCTION**	**4,048.00**

Schedule Activity No.	LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTE	**[X] SAFETY REQUIREMENTS HAVE BEEN ME**

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATED SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Description of Equipment Received
		Crane safety, know when you have a critical lift
		Keeping your focus on safety during demobilization
		Safety of the over the road truck driver entering the site

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	OWNER	Description of Construction Equipment Used Today (incl. Make and Model)	Hours used
		See next page for description.	
		Equipment and material removed today	
		5 flex-a-floats (5 loads)	
		Connex box (2), welder (1load)	
		roto-tiller, crew boat, 2-ramps, misc supplies	
		TOTAL of 9 loads removed today	

Schedule Activity No.	Remarks
	Crew is continuing the demobilization phase of the project. Our goal is to be complete by midday Friday October 20,2006.

Donald Ray Mangrum (signature) 19-Oct-06

CONTRACTOR/SUPERINTENDENT DATE

Donald Ray Mangrum

CONTINUATION PAGE FROM SHEET 1 | REPORT NUMBER 30 | DATE 19-Oct-06

ALCOA GAC PROJECT | Thursday

WORK PERFORMED TODAY

SCHEDULE ACTIVITY NO.	WORK LOCATION AND DESCRIPTION		EMPLOYER	COMPANY	TRADE	HRS
	7:00 AM	Team safety meeting- reviewed work to be performed today, planning and				
		and hazards associated with the task at hand, discussed ways to mitigate				
		the hazards. Discussed changing weather, and Alcoa Incident				
	7:25 AM	Crew worked at SLSDC property loading turcks with equipment and supplies.				
		Production goals were established in the morning meeting,				
		Estimated that a minimum of 8 truck will arrive today.				
		Send marine plant #2 Back to SLSDC to load carbon, tine sled & excavator				
	7:40 AM	Performed rigging, electrical cord and equipment inspections				
		Inspections on all equipment including generator, air compressor, welder				
		Documented inspections for office files.				
	8:00 AM					
	to					
	5:00 PM					

TILLER PROCESS CONTROL LOGS

Process controls for Carbon Deployment
Roto-Tiller

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
25-Sep	TU1-N1	47	47		15m	100	20	30		2:30	15	2.8	100	20		2:30	12:30	12:55	21.0	141.0	1294.0	12:30	KS	
																				590.0	1350.0			
			Carbon was left in hose so we flushed out with 50 gal water after tiller was done rotating, we flush and took																	1588.0	720.0			
			turbidity reading during.																		940.0			
																					2013.0			
																					1980.0			
	TU1-N2	47	47	1:18	1:21	100	15	30	1:19	1:20	20	3.6	100	20	1:19	1:20	1:17	1:27	217.0	237.0	3.5	1:27	KS	
																				370.0	-0.5			
																				44.0	3.1			
	TU1-N3	47	47	1:39	1:42	100	15	30	1:41	1:42	20	3.7	100	30	1:41	1:42	1:39	1:50	72.0	56.0	2010.0	1:50	KS	
																				270.0	2086.0			
																				1400.0	2080.0			
	TU2-N1	47	47	3:15	3:25	100	30	30	3:21	3:25	20	3.8	100	30	3:21	3:25	3:21	3:30	13.0	199.0	499.0	3:30	KS	
																				442.0	486.0			
																				500.0	445.0			
	TU2-N2	47	47	3:35	3:39	100	30	30	3:37	3:40	20	3.9	100	30	3:37	3:40	3:35	3:45	105.0	76.0	120.0	3:45	KS	
																				82.0	148.0			
																				135.0	150.0			
	TU2-N3	47	47	3:48	3:53	100	30	30	3:52	3:54	20	3.9	100	30	3:52	3:54	3:51	4:00	41.0	49.0	120.0	4:00	KS	
																				86.0	124.0			
																				131.0	125.0			
	TU3-N3	47	47	4:03	4:07	100	30	30	4:05	4:08	20	3.9	100	30	4:05	4:08	4:04	4:14	50.0	58.0	1750.0	4:14	KS	
																				1455.0	2071.0			
																				1881.0	1837.0			
	TU3-N2	47	47	4:19	4:22	100	30	30	4:20	4:23	20	3.9	100	30	4:20	4:23	4:18	4:28	51.0	53.0	1250.0	4:28	KS	
																				1565.0	1332.0			
																				1326.0	3.1			
	TU3-N1	47	47	4:30	4:37	100	30	30	4:35	4:38	20	3.9	100	30	4:35	4:38	4:33	4:43	77.0	23.0	7.0	4:43	KS	
																				160.0	1.7			
																				49.0	1.7			
26-Sep	TU4-N1	94	94	8:42	9:00	100	20	60	8:56	9:01	20	3.9	100	30	8:56	9:01	8:55	9:05	9.0	110.0	357.0	9:05	KS	
																				249.0	243.0			
																				330.0	230.0			
	TU4-N2	94	94	9:59	10:04	100	20	60	10:01	10:05	20	3.9	100	30	10:01	10:05	9:55	10:07	9.0	113.0	351.0	10:07	KS	
																				402.0	225.0			
	TU4-N3	94	94	10:14	10:22	100	20	60	10:18	10:23	20	3.9	100	30	10:18	10:23	10:15	10:25	49.0	51.0	1049.0	10:25	KS	
																				802.0	1147.0			
	TU5-N3	47	47	10:30	10:35	100	20	30	10:33	10:36	20	3.9	100	30			10:31	10:41	203.0	183.0	5.2	10:41	KS	
																				9.0	1.3			
	TU5-N2	47	47	10:47	10:50	100	20	30	10:48	10:51	20	3.9	100	30			10:44	10:54	64.0	71.0	179.0	10:54	KS	
																				210.0	118.0			
	TU5-N1	94	94	11:00	11:06	100	20	60	11:02	11:07	20	3.9	100	30			10:58	11:09	61.0	60.0	225.0	11:09	KS	
																				190.0	194.0			
																				260.0	174.0			
29-Sep	TU6-N1	47	47	11:20	11:28	100	20	30	11:26	11:28	15-16	2.9-3.1	100	20			11:24	11:33	-0.8	-0.6	0.3	11:33	KS	
																				1.2	0.1			
																				0.0	-0.1			
	TU6-N2	47	47	12:13	12:17	100	20	30	12:15	12:17	16	3	100	20	12:15	12:17	12:11	12:19	0.0	-0.4	2.2	12:19	KS	
						*Reduced RPM to 7														48.4	-0.8			
																				53.5	-0.3			
	TU6-N3	47	47	12:40	12:48	100	20	30	12:46	12:48	16	3	100	20	12:46	12:49	12:38	12:53	10.0	2.9	0.3	12:53	KS	
																				0.1	0.7			
																				-0.1	3.2			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
	TU7-N3	47	47	1:07	12:12	100	20	30	1:11	12:13	16	3	100	20	1:11	1:14	1:08	1:18	1.1	1.1	4.1	1:18	KS	
																				3.9	-0.2			
																				0.0	-0.7			
	TU7-N2	94	94	1:17	1:27	100	20	60	1:24	1:28	16	3	100	20	1:24	1:28	1:22	1:31	4.3	4.1	1.8	1:31	KS	
																				3.6	-0.6			
																				0.3	-0.6			
	TU7-N1	94	94	1:38	1:45	100	20	60	1:40	1:45	16	3	100	20	1:40	1:45	1:35	1:46	10.5	8.9	0.0	1:46	KS	
																				2.6	0.7			
																				0.9	4.3			
	TU8-N1	94	94	3:00	3:08	100	20	60	3:05	3:09	16	3	100	20	3:05	3:09	3:02	3:13	5.5	13.1	2.2	3:13	KS	
																				7.4	6.0			
																				7.8	3.4			
	TU8-N2	94	94	3:17	3:23	100	20	60	3:20	3:24	16	3	100	20			3:18	3:30	1.7	1.8	0.1	3:30	KS	
																				1.4	10.5			
																				0.9	8.1			
	TU8-N3	94	94	3:34	3:40	100	20	60	3:37	3:41	16	3	100	20			3:35	3:47	0.5	3.3	4.5	3:47	KS	
																				1.2	9.3			
																				4.6	9.6			
	TU9-N3	47	47	4:02	4:05	100	20	30	4:04	4:06	16	3	100	20			4:00	4:10	1.0	-1.0	-0.9	4:10	KS	
																				-0.9	2.0			
																				-0.8	4.9			
	TU9-N2	47	47	4:09	4:18	100	20	30	4:16	4:19	16	3	100	20			4:15	4:22	0.2	-0.1	-0.2	4:22	KS	
																				0.4	3.0			
																				2.5	3.3			
	TU9-N1	47	47	4:20	4:23	100	20	30	4:22	4:24	16	3	100	20				4:24	1.6	1.5	1.5	4:31	KS	
																				2.1	1.8			
																				1.6	2.3			
2-Oct	TU1-N4	94	94	1:17	1:40	100	20	60	1:37	1:41	16	2.9	100	20	1:37	1:42	1:34	1:44	9.0	4.0	30.6	1:44	KS	
																				18.8	118.0			
																				27.0	46.4			
	TU1-N5	94	94	1:44	1:55	100	20	60	1:52	1:56	16	2.9	100	20	1:52	1:57	1:49	1:59	45.5	25.3	-0.6	1:59	KS	
																				2.9	-1.3			
																				1.2	-1.3			
	TU2-N5	94	94	1:58	2:11	100	20	60	2:08	2:12	17	3.1	100	20	2:08	2:13	2:05	2:15	18.4	15.1	5.7	2:15	KS	
																				10.8	29.0			
																				5.0	1.4			
	TU2-N4	94	94?	2:13	2:25	100	20	60	2:22	2:26	16	2.8	100	20	2:22	2:27	2:19	2:29	25.0	25.6	5.2	2:29	KS	
		One pail was kicked and a little split out																		8.8	10.5			
																				4.0	3.5			
	TU3-N4	94	94	2:27	2:43	100	20	60	2:40	2:44	16	2.9	100	20	2:40	2:45	2:37	2:47	12.0	10.0	228.0	2:47	KS	
																				21.4	250.0			
																				68.6	175.6			
	TU3-N5	94	94	2:47	2:55	100	20	60	2:52	2:56	16	2.9	100	20	2:52	2:57	2:49	2:59	178.0	138.0	7.4	2:59	KS	
																				44.2	11.8			
																				11.0	2.7			
	TU4-N5	94	94	2:59	3:10	100	20	60	3:07	3:11	16	2.9	100	20	3:07	3:12	3:04	3:14	25.0	21.0	7.5	3:14	KS	
																				8.5	39.7			
																				5.2	42.0			
	TU4-N4	94	94	3:13	3:22	100	20	60	3:19	3:23	16	2.9	100	20	3:19	3:24	3:17	3:27	18.0	11.0	5.7	3:27	KS	
																				8.9	24.7			
																				12.6	37.5			
3-Oct	MAU3-N3	70.5	70.5	2:22	2:31	100	20	45	2:29	2:32	15	2.8	100	20	2:29	2:33	2:26	2:36	19.0	14.8	6.7	2:36	KS	
																				17.2	1.5			
																				10.4	0.8			
	MAU3-N4	70.5	70.5	2:34	2:43	100	20	45	2:41	2:44	15	2.7	100	20	2:41	2:45	2:38	2:48	40.0	29.7	2.0	2:48	KS	
																				11.2	0.4			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
																				9.7	0.1			
	MAU3-N5	70.5	70.5	2:45	2:55	100	20	45	2:53	2:56	15	2.8	100	20	2:53	2:57	2:50	3:00	30.0	25.6	2.5	3:00	KS	
																				5.2	5.3			
																				3.4	10.4			
	MAU3-N6	70.5	70.5	2:58	3:04	100	20	45	3:05	3:08	15	2.8	100	20	3:05	3:09	3:02	3:12	46.8	41.5	4.3	3:12	KS	
																				23.2	0.7			
																				8.7	19.7			
	MAU3-N7	70.5	70.5	3:09	3:19	100	20	45	3:17	3:20	15	2.8	100	20	3:17	3:21	3:14	3:24	45.4	19.0	6.0	3:24	KS	
																				14.9	1.4			
																				6.5	1.0			
	MAU3-N8	70.5	70.5	3:21	3:30	100	20	45	3:28	3:31	15	2.8	100	20	3:28	3:32	3:25	3:35	16.4	19.0	0.1	3:35	KS	
																				3.6	6.1			
																				1.6	-0.5			
	MAU3-N9	70.5	70.5	3:33	3:45	100	20	45	3:43	3:46	15	2.8	100	20	3:43	3:47	3:39	3:49	12.0	8.4	0.2	3:49	KS	
																				6.8	0.0			
																				2.2	15.4			
	MAU3-N10	70.5	70.5	3:48	3:59	100	20	45	3:56	4:00	15	2.8	100	20	3:56	4:01	3:52	4:02	17.0	13.8	7.8	4:02	KS	
																				13.7	1.0			
																				10.6	1.6			
	MAU3-N11	70.5	70.5	4:02	4:11	100	20	45	4:08	4:12	15	2.7	100	20	4:08	4:13	4:05	4:15	26.5	13.1	1.6	4:15	KS	
																				5.4	-0.5			
																				1.6	2.3			
	MAU2-N11	70.5	70.5	10:00	10:06	100	20	45	10:05	10:08	15	2.9	100	20	10:05	10:09	10:01	10:11	-0.6	-0.3	166.0	10:11	KS	
																				62.0	166.1			
																				134.2	151.0			
	MAU2-N10	70.5	70.5	10:08	10:24	100	20	45	10:22	10:25	15	2.9	100	20	10:22	10:26	10:19	10:29	50.0	53.9	58.3	10:29	KS	
																				85.4	54.6			
																				66.5	59.4			
	MAU2-N9	70.5	70.5	10:30	10:38	100	20	45	10:36	10:39	15	2.9	100	20	10:36	10:40	10:32	10:42	63.0	31.1	6.9	10:42	KS	
																				18.1	-0.6			
																				14.5	5.5			
	MAU2-N8	70.5	70.5	10:42	10:51	100	20	45	10:49	10:52	15	2.8	100	20	10:49	10:53	10:46	10:56	14.1	9.0	-1.4	10:56	KS	
																				1.9	-0.9			
																				2.5	-0.7			
	MAU2-N7	70.5	70.5	10:55	11:05	100	20	45	11:03	11:06	15	2.9	100	20	11:03	11:07	10:59	11:09	16.0	14.0	2.5	11:09	KS	
																				8.6	1.6			
																				5.2	-1.3			
	MAU2-N6	70.5	70.5	11:08	11:36	100	20	45	11:34	11:37	15	2.9	100	20	11:34	11:38	11:31	11:41	0.8	0.0	-1.2	11:41	KS	
																				-0.2	9.6			
																				8.0	10.5			
	MAU2-N5	70.5	70.5	11:39	11:52	100	20	45	11:50	11:53	15	2.9	100	20	11:50	11:54	11:46	11:56	9.2	4.1	0.1	11:56	KS	
																				3.4	-0.1			
																				1.4	-0.6			
	MAU2-N4	70.5	70.5	1:00	1:16	100	20	45	1:14	1:17	15	2.8	100	20	1:14	1:18	1:10	1:20	13.0	5.2	0.1	1:20	KS	
																				2.5	-0.9			
																				0.3	-1.1			
	MAU2-N3	70.5	70.5	1:19	1:36	100	20	45	1:34	1:37	15	2.7	100	20	1:34	1:38	1:31	1:41	12.0	11.4	0.3	1:41	KS	
																				2.2	0.3			
																				0.9	-0.3			
	MAU2-N2	70.5	70.5	1:39	1:55	100	20	45	1:53	1:56	15	2.7	100	20	1:53	1:57	1:50	2:00	29.0	1.4	0.0	2:00	KS	
																				1.4	4.4			
																				0.2	-0.2			
	MAU3-N2	70.5	70.5	2:01	2:19	100	20	45	2:17	2:20	15	2.8	100	20	2:17	2:21	2:13	2:23	0.4	-0.4	-0.7	2:23	KS	
																				0.1	0.2			
																				-0.1	-0.7			
4-Oct	MAU4-N2	70.5	70.5	9:45	9:55	100	20	60	9:53	9:56	20	3.7	100	40	9:53	9:57	9:50	10:00	6.7	42.7	-1.0	10:00	KS	27

Date	Roto-tiller foot print #	carbon dose per foot print		mixing time for carbon/water		flush line with water (Based on martix flow rate & line length)		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water (Based on martix flow rate & line length)		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
		target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
																				10.6	-1.5			
																				1.7	-1.6			
	MAU5-N2	70.5	70.5	9:59	10:10	100	20	60	10:08	10:11	20	3.8	100	40	10:08	10:12	10:04	10:14	12.9	8.3	-0.2	10:14	KS	27
																				65.2	-0.6			
																				7.0	-1.3			
														90° TIL			10:18	10:21	START	36.1		10:21	KS	27
																				139.6				
																			FINISH	136.9				
	MAU4-N11	70.5	70.5	10:30	10:38	100	20	60	10:36	10:39	20	3.7	100	40	10:36	10:40	10:33	10:43	-1.6	101.0	1.4	10:43	KS	27
																				28.9	2.2			
																				44.3	8.5			
	MAU4-N10	70.5	70.5	10:42	10:51	100	20	60	10:49	10:52	20	3.7	100	40	10:49	10:53	10:45	10:55	36.6	22.4	4.8	10:55	KS	27
																				11.3	-0.4			
																				10.3	-1.6			
	MAU4-N9	70.5	70.5	10:54	11:05	100	20	60	11:03	11:06	20	3.7	100	40	11:03	11:07	10:59	11:09	54.1	48.3	9.8	11:09	KS	27
																				14.6	7.0			
																				29.4	1.1			
	MAU4-N8	70.5	70.5	11:08	11:17	100	20	60	11:15	11:18	20	3.7	100	40	11:15	11:19			41.0	124.5	8.0	11:22	KS	27
																	11:12	11:22		228.4	1.1			
																				75.0	4.3			
	MAU4-N7	70.5	70.5	11:20	11:32	100	20	60			20	3.7	100	40			11:25	11:34	35.2	37.5	9.2	11:34	KS	27
									11:29	11:33										15.4	1.6			
															11:29	11:34				4.5	0.0			
	MAU4-N6	70.5	70.5	11:34	11:47	100	20	60	11:44	11:48	20	3.7	100	40	11:44	11:49	11:40	11:50	30.0	21.1	3.9	11:50	KS	27
																				4.0	-0.7			
																				2.6	-0.6			
	MAU4-N5	70.5	70.5	11:49	11:59	100	20	60	11:57	12:00	20	3.7	100	40	11:57	12:01	11:53	12:03	29.1	29.4	4.8	12:03	KS	27
																				2.3	1.7			
																				9.5	2.0			
	MAU4-N4	70.5	70.5	11:52	12:12	100	20	60	12:10	12:13	20	3.7	100	40	12:10	12:14	12:06	12:16	36.7	53.7	4.6	12:16	KS	27
																				1.5	0.5			
																				0.4	0.6			
4-Oct	MAU4-N3	70.5	70.5	12:14	12:24	100	20	60	12:22	12:25	20	3.7	100	40	12:22	12:26	12:19	12:29	56.7	64.7	2.9	12:29	KS	29
																				5.1	1.5			
																				2.5	2.0			
	MAU5-N3	70.5	70.5	1:13	1:19	100	20	60	1:17	1:20	20	3.7	100	40	1:17	1:21	1:14	1:24	-0.4	1.1	25.1	1:24	KS	30
																				15.0	0.7			
																				14.9	80.0			
																	1:27	1:30		22.6				
																				5.0				
																				2.9				
	MAU5-N4	70.5	70.5	1:22	1:47	100	20	60	1:45	1:48	20	3.7	100	40	1:45	1:49	1:42	1:52	8.2	30.7	6.3	1:52	KS	29
																				26.6	3.3			
																				1.8	1.4			
																	1:53	1:56		72.3				
																				128.3				
																				66.8				
	MAU5-N5	70.5	70.5	1:51	2:04	100	20	60	2:02	2:05	20	3.7	100	40	2:02	2:06	1:58	2:08	95.0	23.5	1.6	2:08	KS	29
																				0.2	-0.2			
																				1.8	0.5			
																	2:09	2:12		94.4				
																				800.0				
																				109.0				
	MAU5-N6	70.5	70.5	2:07	2:21	100	20	60	2:19	2:22	20	3.7	100	40	2:19	2:23	2:17	2:27	57.4	104.0	0.3	2.27	KS	29
																				19.4	1.0			
																				0.0	0.9			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
																	2:28	2:31		55.8				
																				20.0				
																				4.5				
	MAU5-N7	70.5	70.5	2:25	2:39	100	20	60	2:37	2:40	20	3.7	100	40	2:37	2:41	2:34	2:44	112.0	70.8	5.8	2:44	KS	29
																				18.1	2.8			
																				9.6	59.6			
																	2:45	2:48		104.3				
																				16.4				
																				3.6				
	MAU5-N8	70.5	70.5	2:49	2:56	100	20	60	2:54	2:57	20	3.7	100	40	2:54	2:58	2:51	3:01	105.6	85.1	1.3	3:01	KS	28
																				9.4	-0.6			
																				1.3	-0.4			
																	3:02	3:05	176.0	380.0	77.0			
	MAU5-N9	70.5	70.5	3:10	3:15	100	20	60	3:13	3:16	20	3.7	100	40	3:13	3:17	3:09	3:19	86.0	33.7	7.3	3:19	KS	28
																				10.5	0.9			
																				11.0	0.1			
																	3:20	3:23	119.0	33.2	27.4			
	MAU5-N10	70.5	70.5	3:26	3:31	100	20	60	3:29	3:32	20	3.7	100	40	3:39	3:33	3:26	3:36	109.0	33.1	5.9	3:36	KS	28
																				8.0	1.1			
																				27.0	1.5			
																	3:37	3:40	32.0	45.7	34.0			
	MAU5-N11	70.5	70.5	3:45	3:49	100	20	60	3:47	3:51	20	3.7	100	40	3:47	3:51	3:44	3:54	49.1	26.0	42.1	3:54	KS	29
																				36.0	4.6			
																				10.8	16.1			
																	3:55	3:58	92.4	556.0	34.9			
5-Oct	MAU6-N11	70.5	70.5	8:53	9:00	100	20	60	8:58	9:01	20	3.7	100	40	8:58	9:02	8:57	9:06	24.8	24.0	22.7	9:06	KS	27
																				13.7	17.3			
																				19.1	13.4			
																				11.2	6.7			
																					10.9	9:06		
	MAU6-N10	70.5	70.5	9:01	0:15	100	20	60	9:13	9:16	20	3.7	100	40	9:13	9:17	9:12	9:20	42.0	35.6	4.8		KS	30
																				35.0	5.5			
																				18.1	3.5			
																				89.3	8.9	9:20		
	MAU6-N9	70.5	70.5	9:16	9:25	100	20	60	9:23	9:27	20	3.7	100	40	9:23	9:27	9:23	9:31	43.3	62.5	224.0		KS	31
																				37.8	88.1			
																				62.0	101.1			
																				77.0	44.8	9:31		
	MAU6-N8	70.5	70.5	9:26	9:37	100	20	60	9:35	9:39	20	3.7	100	40	9:35	9:39	9:34	9:43	50.0	86.4	4.7		KS	38
																				10.7	5.8			
						7 PLUGGED NOZZLES								**7 PLUGGED NOZZLES**						6.0	13.2			
																				11.7	6.2	9:43		
	MAU6-N7	70.5	70.5	10:29	10:34	100	20	60	10:32	10:35	20	3.7	100	40	10:32	10:36	10:29	10:39	2.4	3.0	37.7		KS	28
																				44.0	37.0			
																				11.3	15.6			
																				58.2	18.1	10:39		
	MAU6-N6	70.5	70.5	10:35	10:47	100	20	60	10:45	10:49	20	3.7	100	40	10:45	10:49	10:42	10:52	99.0	48.7	30.1		KS	27
																				33.2	774.0			
																				30.1	95.2			
																				7.0	58.2			
																					77.0	10:52		
	MAU6-N5	70.5	70.5	10:48	11:05	100	20	60	11:03	11:06	20	3.7	100	40	11:03	11:07	11:02	11:11	17.7	17.9	36.1		KS	28
																				95.8	128.7			
																				44.0	72.7			
																				24.8	46.7			
																					45.0	11:11		

Date	Roto-tiller foot print #	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
		target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
	MAU6-N4	70.5	70.5	11:07	11:17	100	20	60	11:15	11:18	0:00	3.9	100	40	11:15	11:19	11:14	11:23	48.4	45.1	28.1		KS	29
																				74.2	23.7			
																				29.5	20.3			
																				77.5	20.1			
																					23.6	11:23		
	MAU6-N3	70.5	70.5	11:18	11:31	100	20	60	11:29	11:32	20	3.7	100	40	11:29	11:33	11:26	11:37	61.0	69.0	40.1		KS	29
																				105.2	18.0			
																				30.0	6.4			
																				5.6	61.1			
																					33.3	11:37		
	MAU6-N2	70.5	70.5	11:32	11:46	100	20	60	11:44	11:47	20	3.8	100	40	11:44	11:48	11:43	11:52	42.9	54.3			KS	29
																			20.9	90.1				
						4 NOZZLES PLUGGED													44.3	89.9				
																			25.1	15.6				
																			53.1	25.1	21.0	11:52		
	MAU7-N2	70.5	70.5	12:23	12:33	100	20	60	12:31	12:34	20	3.8	100	40	12:31	12:35	12:30	12:39	4.5	3.4	17.7			
		Reduced RPMs to 5-7 est.																		10.7	49.5			
																				19.4	22.9			
																				13.0	53.4			
																					39.4	12:39		
	MAU7-N3	70.5	70.5	12:34	12:48	100	20	60	12:46	12:49	20	3.7	100	40	12:46	12:50	12:43	12:53	60.7	21.7	9.7		KS	27
																				37.0	17.9			
																				30.3	22.3			
																				24.7	38.1			
																					84.3	12:53		
	MAU7-N4	70.5	70.5	12:49	12:56	100	20	60	12:57	1:00	20	3.8	100	40	12:57	1:01	12:55	1:04	101.1	10.7	19.6		KS	27
																				62.0	33.3			
																				111.2	9.1			
																				26.9	6.9			
																					13.3	1:04		
	MAU7-N5	70.5	70.5	1:00	1:10	100	20	60	1:08	1:11	20	3.8	100	40	1:08	1:12	1:06	1:16	127.3	89.6	52.3		KS	27
																				111.1	21.6			
																				71.0	12.8			
																				41.7	16.2			
																					24.3			
	MAU7-N6	70.5	70.5	1:11	1:23	100	20	60	1:21	1:24	0:00	3.8	100	40	1:21	1:25	1:19	1:28	40.3	39.3	24.8			
																				37.7	97.3			
						1 NOZZLE PLUGGED (we left it)								**1 NOZZLE PLUGGED (WE LEFT IT)**						50.0	71.1			
																				34.4	55.5			
																					61.6	1:28	KS	27
	MAU7-N7	70.5	70.5	1:35	1:43	100	20	60	1:41	1:44	20	3.8	100	40	1:41	1:45	1:39	1:48	20.6	9.1	219.4			
																				12.4	97.7			
																				86.5	60.1			
																				276.1	80.2			
																					62.9	1:48		
	MAU7-N8	70.5	70.5	1:44	1:55	100	20	60	1:53	1:56	20	3.8	100	40	1:53	1:57	1:51	2:06		46.1	14.6		KS	27
																				29.3	90.1			
																			11.1	14.7	41.2			
																				20.9	23.8			
																					9.0			
																					16.7			
																					38.2			
																					14.8			
																					11.6			
																					9.2			
																					11.1	2:06		

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
	MAU7-N9	70.5	70.5	2:08	2:12	100	20	60	2:10	2:13	20	3.7	100	40	2:10	2:14	2:08	2:24	29.4	10.6	10.3		KS	27
																				27.8	31.2			
																				8.5	20.3			
																				5.0	24.6			
																					31.6			
																					19.4			
																					22.1			
																					19.0			
																					18.9			
																					18.8			
																					15.7	2:24		
	MAU7-N10	70.5	70.5	2:30	2:39	100	20	60	2:37	2:40	20	3.7	100	40	2:37	2:41	2:36	2:51	15.1	15.8	-0.5		KS	27
																				6.0	3.7			
																				3.4	4.8			
																				0.8	1.8			
																					2.1			
																					18.6			
																					17.2			
																					22.3			
																					9.6			
																					9.2			
																					4.9	2:52		
	MAU7-N11	70.5	70.5	2:55	3:06	100	20	60	3:04	3:07	20	3.7	100	40			2:55	3:11	36.5	13.6	-0.8		KS	28
																				11.0	5.8			
																				4.6	5.7			
																				4.1	0.2			
								5 NOZZLES PLUGGED													3.1	3:11		
	MAU8-N11	70.5	70.5	3:55	4:00	100	20	60	3:58	4:01	20	3.8	100	40	3:58	4:02	3:56	4:05	1.2	4.9	41.2		KS	25
																				18.9	16.8			
																				12.5	24.3			
																				41.5	9.9			
																					41.0	4:05		
	MAU8-N10	70.5	70.5	4:01	4:12	100	20	60	4:10	4:13	20	3.8	100	40	4:10	4:14	4:08	4:17	121.3	70.2	142.1		KS	25
																				61.2	85.0			
																				75.2	76.2			
																				108.7	89.8			
																					76.2	4:17		
	MAU8-N9	70.5	70.5	4:13	4:22	100	20	60	4:20	4:23	20	3.7	100	40	4:20	4:24	4:19	4:28	135.4	119.0	51.0		KS	25
																				123.0	19.3			
																				132.1	18.2			
																				71.5	24.1			
																				0.1	25.2	4:28		
6-Oct	MAU8-N8	70.5	70.5	8:23	8:44	100	20	60	8:42	8:45	20	3.8	100	40	8:42	8:46	8:38	8:48	2.0	0.3	9.0	8:48	KS	26
																				2.1	17.2			
																				1.7	11.1			
	MAU8-N7	70.5	70.5	8:45	8:59	100	20	60	8:57	9:00	20	3.9	100	40	8:59	9:01	8:53	9:03	25.5	28.9	20.0	9:03	KS	25
																				44.8	19.3			
																				29.5	17.4			
	MAU8-N6	70.5	70.5	9:00	9:10	100	20	60	9:08	9:11	20	4.0	100	40	9:08	9:12	9:05	9:15	13.9	96.1	59.1	9:15	KS	25
																				95.3	76.8			
																				82.4	97.2			
	MAU8-N5	70.5	70.5	9:11	9:23	100	20	60	9:21	9:24	20	4.0	100	40	9:21	9:25	9:18	9:28	12.14	99.5	211.6	9:28	KS	25
																				51.2	180.0			
						A SURGE FROM THE LOCK OCCURRED? Possibly in sediment														202.1	94.9			
	MAU8-N4	70.5	70.5	9:24	10:10	100	20	60	10:08	10:11	20	4.0	100	40	10:08	10:12	10:05	10:15	23.5	21.4	64.3	10:15	KS	25
																				23.0	18.7			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water (Based on martix flow rate & line length)		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water (Based on martix flow rate & line length)		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
																				68.3	3.0			
	MAU8-N3	70.5	70.5	10:11	10:27	100	20	60	10:25	10:28	20	3.9	100	40	10:25	10:29	10:21	10:31	21.8	25.8	19.0	10:31	KS	25
																				11.2	8.0			
																				13.2	4.5			
	MAU8-N2	70.5	70.5	10:28	10:40	100	20	60	10:38	10:41	20	3.9	100	40	10:38	10:42	10:34	10:44	9.2	10.23	11.0	10:44	KS	25
																				10.5	12.9			
							0 PLUGGED NOZZLES													5.7	3.6			
	MAU9-N2	70.5	70.5	10:59	11:04	100	20	60	11:02	11:05	20	3.9	100	40	11:02	11:06	10:59	11:09	0.5	1.1	4.1	11:09	KS	27
																				9.8	3.1			
																				12.4	3.4			
	MAU9-N3	70.5	70.5	11:06	11:18	100	20	60	11:16	11:19	20	3.9	100	40	11:16	11:20	11:13	11:23	8.2	7.4	8.7			
																				8.9	6.2			
																				10.2	7.3			
	MAU9-N4	70.5	70.5	11:19	11:31	100	20	60	11:29	11:32	20	3.9	100	40	11:29	11:33	11:26	11:36	3.9	3.7	18.3	11:36	KS	26
																				4.6	19.4			
																				4.5	28.0			
	MAU9-N5	70.5	70.5	11:32	11:46	100	20	60	11:44	11:47	20	3.9	100	40	11:44	11:48	11:40	11:50	11.9	15.7	0.9	11:50	KS	25
																				10.3	19.5			
																				6.8	9.0			
	MAU9-N6	70.5	70.5	11:47	11:58	100	20	60	11:56	11:59	20	3.5	100	40	11:56	12:00	11:52	12:02	22.2	29.4	18.0	12:02	KS	25
																				24.1	20.2			
																				56.0	19.4			
	MAU9-N7	70.5	70.5	11:59	12:10	100	20	60	12:08	12:11	20	3.5	100	40	12:08	12:12	12:05	12:15	33.1	27.0	28.9	12:15	KS	26
																				19.43	29.1			
						2 PLUGGED NOZZLES (1 IN MIDDLE, ON EACH END OF MANIFOLD)														18.0	22.6			
	MAU9-N8	70.5	70.5	12:20	12:29	100	20	60	12:27	12:30	20	3.4	100	40	12:27	12:31	12:23	12:33	2.9	4.2	10.5	12:33	KS	27
																				14.4	17.7			
																				17.8	21.0			
	MAU9-N9	70.5	70.5	12:32	12:41	100	20	60	12:39	12:42	20	3.3	100	40	12:39	12:43	12:36	12:46	17.4	10.5	3.8	12:46	KS	26
																				11.0	28.0			
																				8.9	12.1			
	MAU9-N10	70.5	70.5	12:42	12:58	100	20	60	12:56	12:59	20	3.4	100	40	12:56	1:00	12:52	1:02	19.1	24.4	15.8	1:02	KS	26
																				37.7	54.0			
																				18.9	41.9			
	MAU9-N11	70.5	70.5	12:59	1:12	100	20	60	1:10	1:13	20	3.8	100	40	1:10	1:14	1:06	1:16	60.1	66.6	12.7	1:16	KS	26
																				38.4	13.6			
						1 MORE NOZZLE PLUGGED - 3 TOTAL (NOW WE CLEANED)														38.4	35.0			
	MAU10-N11	70.5	70.5	1:45	1:49	100	20	60	1:47	1:50	20	3.5	100	40	1:47	1:51	1:43	1:53	44.0	3.4	13.9	1:53	KS	25
																				19.1	17.9			
																				19.1	49.1			
	MAU10-N10	70.5	70.5	1:50	2:03	100	20	60	2:01	2:04	20	3.4	100	40	2:01	2:05	1:58	2:08	75.1	90.2	4.0	2:08	KS	24
																				22.1	20.1			
																				42.2	33.1			
	MAU10-N9	70.5	70.5	2:05	2:15	100	20	60	2:13	2:16	20	3.4	100	40	2:13	2:17	2:09	2:19	126.0	9.0	23.3	2:19	KS	24
						44 BATCHES READY FOR MONDAY														34.7	6.4			
						3,186 LBS OF CARBON IN CONTAINER														31.1	17.3			
						3 PALLETS ON THE DECK															11.1			
9-Oct	MAU10-N8	70.5	70.5	8:09	8:13	100	20	60	8:11	8:14	20	3.7	100	40	8:11	8:15	8:09	8:19	5.0	12.9	3.5	8:19	KS	24
																				49.9	44.1			
						Started with windy condition - bouncing occurs														42.3	6.3			
	MAU10-N7	70.5	70.5	8:15	8:24	100	20	60	8:22	8:25	20	3.5	100	40	8:22	8:26	8:20	8:30	2.0	22.0	1.1	8:30	KS	24
																				13.1	30.0			
																				5.5	5.5			
	MAU10-N6	70.5	70.5	8:25	8:42	100	20	60	8:40	8:43	20	3.6	100	40	8:40	8:44	8:37	8:47	10.4	9.0	6.0	8:47	KS	24
																				11.8	5.6			
																				9.6	12.9			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
	MAU10-N5	70.5	70.5	8:46	8:54	100	20	60	8:52	8:55	20	3.5	100	40	8:52	8:56	8:50	9:00	30.2	25.4	64.4	9:00	KS	24
																				23.1	30.1			
																				34.0	39.3			
	MAU10-N4	70.5	70.5	8:59	9:06	100	20	60	9:04	9:07	20	3.5	100	40	9:04	9:08	9:01	9:11	130.1	119.3	43.2	9:11	KS	24
																				49.0	43.3			
																				56.1	42.3			
	MAU10-N3	70.5	70.5	9:10	9:17	100	20	60	9:15	9:18	20	3.5	100	40	9:15	9:19	9:13	9:23	99.0	80.0	21.2	9:23	KS	24
																				41.0	35.5			
																				38.6	25.0			
	MAU10-N2	70.5	70.5	9:22	9:33	100	20	60	9:31	9:34	20	3.6	100	40	9:31	9:35	9:28	9:38	50.1	44.9	9.1	9:38	KS	24
																				36.9	11.5			
						1 NOZZLE PLUGGED FROM LAST FRIDAY - NO OTHERS- JUST LEFT IT														19.2	12.3			
	MAU11-N2	70.5	70.5	9:45	9:55	100	20	60	9:53	9:56	20	3.5	100	40	9:53	9:56	9:51	10:01	4.1	2.4	12.4	10:01	KS	25
																				8.4	34.0			
																				6.0	49.5			
	MAU11-N3	70.5	70.5	9:58	10:08	100	20	60	10:06	10:09	20	3.5	100	40	10:06	10:10	10:03	10:13	47.3	42.1	8.3	10:13	KS	28
																				31.9	21.1			
																				21.9	16.8			
	MAU11-N4	70.5	70.5	10:11	10:19	100	20	60	10:17	10:20	20	3.5	100	40	10:17	10:21	10:14	10:24	23.1	20.4	3.7	10:24	KS	28
																				9.1	26.7			
																				8.4	17.6			
	MAU11-N5	70.5	70.5	10:23	10:30	100	20	60	10:28	10:31	20	3.5	100	40	10:28	10:32	10:25	10:35	38.1	35.0	4.3	10:35	KS	28
																				28.1	41.1			
								5 NOZZLES WERE PLUGGED												2.5	25.0			
	MAU11-N6	70.5	70.5	10:34	10:42	100	20	60	10:40	10:43	20	3.5	100	40	10:40	10:44	10:37	10:47	3.1	53.3	58.4	10:47	KS	28
																				30.2	51.6			
																				19.8	14.7			
	MAU11-N7	70.5	70.5	11:15	11:20	100	20	60	11:18	11:21	20	3.4	100	40	11:18	11:22	11:15	11:25	15.0	9.6	41.0	11:25	KS	23
																				13.1	18.2			
																				70.0	34.1			
	MAU11-N8	70.5	70.5	11:24	11:32	100	20	60	11:30	11:33	20	3.4	100	40	11:30	11:34	11:28	11:38	20.5	20.4	39.2	11:38	KS	23
																				55.0	21.7			
																				38.8	14.7			
	MAU11-N9	70.5	70.5	11:37	11:47	100	20	60	11:45	11:48	20	3.3	100	40	11:45	11:49	11:42	11:52	17.1	18.4	3.7	11:52	KS	23
																				22.0	15.6			
																				20.8	47.0			
	MAU11-N10	70.5	70.5	11:50	12:01	100	20	60	11:59	12:02	20	3.4	100	40	11:59	12:03	11:57	12:07	32.6	21.0	16.3	12:07	KS	23
																				13.3	19.8			
																				14.2	18.0			
	MAU11-N11	70.5	70.5	12:05	12:13	100	20	60	12:11	12:14	20	3.4	100	40	12:11	12:15	12:09	12:19	40.6	29.0	46.1	12:19	KS	23
																				23.3	19.5			
								0 NOZZLES PLUGGED												24.4	14.8			
	MAU12-N11	70.5	70.5	12:40	12:47	100	20	60	12:45	12:48	20	3.5	100	40	12:45	12:49	12:43	12:53	4.5	3.2	0.7	12:53	KS	23
																				1.7	58.0			
																				1.3	54.3			
	MAU12-N10	70.5	70.5	12:53	1:01	100	20	60	12:59	1:02	20	3.4	100	40	12:59	1:03	12:57	1:07	42.2	49.5	75.2	1:07	KS	23
																				70.2	48.1			
																				90.0	25.3			
	MAU12-N9	70.5	70.5	1:05	1:13	100	20	60	1:11	1:14	20	3.4	100	40	1:11	1:15	1:09	1:19	43.3	33.7	36.4	1:19	KS	23
																				15.4	36.2			
																				35.0	12.7			
	MAU12-N8	70.5	70.5	1:17	1:25	100	20	60	1:23	1:26	20	3.4	100	40	1:23	1:27	1:21	1:31	53.3	36.1	2.4	1:31	KS	23
																				19.0	1.9			
																				15.3	1.9			
	MAU12-N7	70.5	70.5	1:27	1:37	100	20	60	1:35	1:38	20	3.6	100	40	1:35	1:39	1:32	1:42	19.8	20.0	16.1	1:42	KS	24
																				25.0	39.5			

Date	Roto-tiller foot print #	carbon dose per foot print target	carbon dose per foot print actual	mixing time for carbon/water Start	mixing time for carbon/water end	flush line with water (Based on martix flow rate & line length) Line length Ft.	flush line with water Flush Time	carbon deployment per foot print gallons deployed	carbon deployment per foot print start time	carbon deployment per foot print end time	pump flow readings GPM	velocity readings FPS	flush line with water (Based on martix flow rate & line length) Line length Ft.	flush line with water Flush Time	mixing time per foot print start time	mixing time per foot print end time	settling time per foot print start time	settling time per foot print end time	turbidity reading per foot print Pre	turbidity reading per foot print During	turbidity reading per foot print Post	foot print end time time	process operator Initial	PSI
								0 NOZZLES PLUGGED												17.7	32.6			
	MAU12-N6	70.5	70.5	1:50	1:56	100	20	60	1:54	1:57	20	3.7	100	40	1:54	1:58		12:01	6.9	5.3	-1.6	2:01	KS	26
																				10.5	18.0			
																				1.3	5.7			
	MAU12-N5	70.5	70.5	2:00	2:09	100	20	60	2:07	2:10	20	3.8	100	40	2:07	2:11	2:05	2:15	59.9	24.1	4.2	2:15	KS	26
																				13.2	5.8			
																				-6.4	1.4			
	MAU12-N4	70.5	70.5	2:12	2:21	100	20	60	2:19	2:22	20	3.8	100	40	2:19	2:23	2:17	2:27	20.1	11.8	37.5	2:27	KS	26
																				18.8	5.1			
																				18.2	12.7			
	MAU12-N3	70.5	70.5	2:25	2:33	100	20	60	2:31	2:34	20	3.7	100	40	2:31	2:35	2:28	2:38	22.7	25.0	3.2	2:38	KS	26
																				13.5	14.7			
																				13.6	11.3			
	MAU12-N2	70.5	70.5	2:35	2:45	100	20	60	2:43	2:46	20	3.8	100	40	2:43	2:47	2:40	2:50	48.5	23.3	2.2	2:50	KS	27
																				24.8	7.0			
								0 NOZZLES PLUGGED												10.5	9.0			
10-Oct	MAU1-N11	70.5	70.5	8:14	8:22	100	20	60	8:20	8:23	20	4.1	100	40	8:23	8:27	8:18	8:27	0.8	1.1	-0.7		KS	27
																				0.9	-1.3			
																				0.1	0.6			
																				0.5	24.5			
																					2.1	8:27		
	MAU1-N10	70.5	70.5	8:25	8:44	100	20	60	8:42	8:45	20	4.1	100	40	8:42	8:46	8:39	8:49	14.1	9.9	-0.5		KS	28
																				43.2	46.8			
																				114.0	0.0			
																				3.7	49.1			
																					50.4	8:49		
	MAU1-N9	70.5	70.5	8:48	9:08	100	20	60	9:06	9:09	20	4.1	100	40	9:06	9:10	9:04	9:13	27.5	24.9	3.5		KS	28
																				33.2	0.1			
																				66.9	-0.8			
																				16.8	-0.7			
																					-0.5	9:13		
	MAU1-N8	70.5	70.5	9:15	9:35	100	20	60	9:33	9:36	20	3.9	100	40	9:33	9:37	9:31	9:40	4.0	1.9	40.7		KS	28
																				1.8	16.2			
																				2.7	12.3			
																				1.5	15.8			
																					7.7	9:40		
	MAU1-N7	70.5	70.5	9:39	9:56	100	20	60	9:54	9:57	20	4.0	100	40	9:54	9:58	9:52	10:02	5.6	4.0	4.8		KS	28
																				88.6	7.2			
																				53.0	12.4			
																				9.6	12.0			
																					7.3	10:02		
	MAU1-N6	70.5	70.5	9:10	10:15	100	20	60	10:13	10:16	20	4.0	100	40	10:13	10:17	10:11	10:21	-0.2	-0.4	-0.6		KS	29
																				-0.1	-0.4			
																				25.4	4.6			
																				1.5	0.2			
																					-0.3	10:21		
	MAU1-N5	70.5	70.5	10:17	10:22	100	20	60	10:20	10:23	20	4.0	100	40	10:20	10:24	10:23	10:33	116.2	88.1	33.3	10:33	KS	29
																				55.2	25.0			
																				45.4	55.2			
	MAU1-N4	70.5	70.5	10:32	10:43	100	20	60	10:41	10:44	20	4.1	100	40	10:41	10:45	10:37	10:47	40.3	50.1	13.1	10:47	KS	29
																				53.2	1.2			
																				57.2	59.1			
	MAU1-N3	70.5	70.5	10:46	10:55	100	20	60	10:53	10:56	20	4.1	100	40	10:53	10:57	10:50	10:59	116.1	77.4	6.0		KS	29
																				43.3	20.1			
																				76.5	14.1	11:59		

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
	MAU1-N2	70.5	70.5	10:58	11:05	100	20	60	11:03	11:06	20	4.2	100	40	11:03	11:07	11:01	11:10	93.2	72.1	15.3		KS	29
																				65.1	12.4			
								1 PLUGGED NOZZLE												59.6	28.7	11:10		
	MAU13-N11	70.5	70.5	12:43	12:47	100	20	60	12:45	12:48	20	4.2	100	40	12:45	12:49	12:40	12:52	6.8	2.3	22.0		KS	28
																				19.2	19.3			
																				28.7	9.5			
																				38.5	14.5	12:52		
	MAU13-N10	70.5	70.5	12:49	12:58	100	20	60	12:56	12:59	20	4.1	100	40	12:56	1:00	12:54	1:03	94.7	90.1	45.4		KS	28
																				74.3	31.0			
																				46.5	1.0			
																				86.8	22.5			
																					19.5			
																					36.8	1:03		
	MAU13-N9	70.5	70.5	12:59	1:09	100	20	60	1:07	1:10	20	4.2	100	40	1:07	1:11	1:05	1:14	119.9	76.7	55.6		KS	28
																				46.5	32.1			
																				44.4	14.8			
																				65.9	13.9			
																					26.6	1:14		
	MAU13-N8	70.5	70.5	1:11	1:21	100	20	60	1:19	1:22	20	4.1	100	40	1:19	1:23	1:17	1:27	88.6	70.0	37.4		KS	28
																				74.2	26.1			
																				49.2	46.3			
																				56.8	85.7			
																					56.4			
	MAU13-N7	70.5	70.5	1:23	1:34	100	20	60	1:32	1:35	20	4.1	100	20	1:32	1:36	1:29	1:40	131.2	105.3	19.7		KS	28
																				60.2	12.1			
																				58.7	11.6			
						0 NOZZLES PLUGGED														56.3	23.7			
																					28.1	1:40		
	MAU13-N6	70.5	70.5	1:36	1:48	100	20	60	1:46	1:49	20	4.1	100	20	1:46	1:50	1:42	1:54	97.7	50.4	0.0		KS	28
																				46.5	8.4			
																				24.3	4.6			
																				10.6	10.4			
																					17.0	1:54		
	MAU13-N5	70.5	70.5	1:50	2:02	100	20	60	2:00	2:03	20	4.1	100	20	2:00	2:04	1:58	2:07	29.3	32.4	32.8		KS	28
																				24.3	71.6			
																				22.2	35.3			
																				5.1	21.2			
																					19.2			
	MAU13-N4	70.5	70.5	2:04	2:22	100	20	60	2:20	2:23	20	4.1	100	20	2:20	2:24	2:18	2:27	1.9	0.1	9.8		KS	28
																				2.4	30.0			
																				3.4	1.3			
																				18.3	40.1			
																					20.0			
	MAU13-N3	70.5	70.5	2:24	2:34	100	20	60	2:32	2:35	20	4.1	100	20	2:32	2:36	2:20	2:31	49.5	43.1	2.7		KS	28
																				33.0	16.1			
																				14.8	11.3			
																				8.8	10.1			
																					19.3			
	MAU13-N2	70.5	70.5	2:36	2:48	100	20	60	2:46	2:49	20	4.2	100	20	2:46	2:50	2:44		52.9	37.9	26.9		KS	28
																				34.2	32.8			
						0 NOZZLES PLUGGED														21.3	14.3			
																				26.3	35.6			
																					24.0	2:53		
11-Oct	UMU1-N8	70.5	70.5	10:20	10:24	100	20	60	10:22	10:25	20	4.1	100	20			10:16	10:29	2.1	4.0	5.4		KS	28
																				0.5	1.4			
																				2.7	2.5			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
																				6.3	3.4			
																					3.9	10:29		
	UMU1-N7	70.5	70.5	10:26	10:37	100	20	60	10:35	10:49	20	4.1	100	20			10:33	10:42	20.1	18.8	1.4		KS	28
																				12.9	5.7			
																				8.2	1.7			
																				11.0	-1.0			
																					-1.2	10:42		
	UMU1-N6	70.5	70.5	10:40	10:48	100	20	60	10:46	10:49	20	4.1	100	20			10:44	10:54	23.7	23.2	9.5		KS	28
																				68.9	7.7			
																				15.4	5.8			
																				11.0	-2.1			
																					7.8	10:54		
	UMU1-N5	70.5	70.5	10:50	11:02	100	20	60	11:00	11:03	20	4.1	100	20			10:59	11:07	25.1	22.7	-0.4		KS	28
																				31.0	-0.3			
																				20.8	-0.7			
																				11.2	1.1			
																					1.8	11:07		
	UMU1-N4	70.5	70.5	11:04	11:15	100	20	60	11:13	11:16	20	4.0	100	20			11:11	11:20	32.1	31.0	12.4		KS	28
																				16.7	9.2			
																				18.6	4.9			
								(CHECKING NOZZLES) 0 PLUGGED												16.4	4.0			
																					1.8	11:20		
	UMU1-N3	70.5	70.5	11:26	11:32	100	20	60	11:30	11:33	20	4.0	100	20			11:28	11:37	6.3	0.9	5.8		KS	28
																				0.5	9.1			
																				15.0	10.4			
																				7.7	8.7			
																					5.8	11:37		
	UMU1-N2	70.5	70.5	11:34	11:44	100	20	60	11:42	11:45	20	3.9	100	20			11:40	11:49	33.3	25.0	22.1		KS	28
																				x	35.5			
																				x	38.8			
																				7.5	33.9			
																					41	11:49		
	UMU1-N1	70.5	70.5	11:46	11:56	100	20	60	11:54	11:57	20	4.0	100	20			11:52	12:02	60.1	47.9	26.6		KS	28
																				32.2	34			
																				28.3	13.2			
																				39.9	14.3			
																					11.8	12:02	KS	28
	UMU2-N1	70.5	70.5	11:58	12:14	100	20	60	12:12	12:15	20	3.9	100	20			12:10	12:32	13.2	11.5	2.6		KS	28
																				1.8	5			
																				16.2	8.2			
																				5.1	3.6			
																					3.4			
	UMU2-N2	70.5	70.5	12:16	12:22	100	20	60	12:20	12:23	20	3.9	100	20			12:23	12:19	13.1	12.4	13.2			
																				11.4	14			
																				12.2	7.7			
																				9.6	6.7			
																					4.6			
	UMU2-N3	70.5	70.5	12:24	12:38	100	20	60	12:36	12:39	20	4.0	100	20			12:35	12:44	12.7	9.7	1			
																				9.3	-1			
																				5.4	-1.1			
								0 NOZZLES PLUGGED												1.3	-0.4			
																					-0.8	12:44		
	UMU2-N4	70.5	70.5	1:50	1:55	100	20	60	1:53	1:56	20	4.0	100	20			12:51	1:01	0.1	-1.1	0		KS	28
																				-1.0	0.9			
																				-1.0	0.8			
																				0.8	-0.2			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
																					5	1:01		
	UMU2-N5	70.5	70.5	12:59	1:07	100	20	60	1:05	1:08	20	4.0	100	20			1:03	1:13	4.4	4.2	11.0		KS	28
																				3.1	10.8			
																				3.3	13.7			
																				1.6	11.0			
																					11.1	1:13		
	UMU2-N6	70.5	70.5	1:09	1:18	100	20	60	1:16	1:19	20	4.0	100	20			1:15	1:24	13.1	12.6	11.6		KS	27
																				2.1	11.9			
																				12.0	17.5			
																				17.2	14.9			
																					7.4	1:24		
	UMU2-N7	70.5	70.5	1:20	1:29	100	20	60	1:27	1:30	20	3.9	100	20			1:26	1:35	15.2	16.8	12.2		KS	28
																				8.8	9.1			
																				15.8	5.4			
																				9.4	3.7			
																					10.1	1:35		
	UMU2-N8	70.5	70.5	1:31	1:40	100	20	60	1:38	1:41	20	3.9	100	20			1:36	1:45	20.3	25.2	0.5		KS	28
																				16.7	0.6			
																				20.7	1.7			
																				9.1	2.6			
																					1.8	1:45		
	UMU3-N8	70.5	70.5	1:42	2:11	100	20	60	2:09	2:12	20	4.0	100	20			1:06	1:16	-1.1	3.4	0.7		KS	27
																				0.2	5.7			
																				2.9	2.2			
								0 NOZZLES PLUGGED												0.7	0.5			
																					7.3	2:16		
	UMU3-N7	70.5	70.5	2:13	2:27	100	20	60	2:25	2:28	20	4.0	100	40									KS	27
	UMU3-N6	70.5	70.5	2:29	2:40	100	20	60	2:38	2:41	20	4.0	100	10			1:37	1:46	15.6	16.1	6.3		KS	27
																				10.4	4.5			
																				11.5	4.5			
																				5.8	4.3			
																					3.0	2:46		
	UMU3-N5	70.5	70.5	2:42	2:54	100	20	60	2:52	2:55	20	4.0	100	40			1:50	1:59	23.2	2.4	5.1		KS	27
																				27.2	5.8			
																				20.0	10.2			
																				14.0	12.6			
																					8.5	2:59		
	UMU3-N4	70.5	70.5	2:56	3:08	100	20	60	3:06	3:09	20	4.0	100	40			2:04	2:13	16.5	13.1	1.9		KS	28
																				7.2	4.7			
																				x	2.8			
																				-0.7	2.1			
																					0.1	3:13		
	UMU3-N3	70.5	70.5	3:10	3:18	100	20	60	3:16	3:19	20	4.0	100	40			2:15	2:24	22.1	22.3	13.8		KS	28
																				29.1	6.7			
																				29.1	19.4			
								1 PLUGGED NOZZLE												15.3	9.3			
																					6.2	3:24		
	UMU3-N2	70.5	70.5	3:20	3:37	100	20	60	3:35	3:38	20	4.0	100	40			2:34	2:43	0.9	0.2	58.2		KS	28
																				13.3	38.7			
																				37.1	32.2			
																				30.0	28.2			
																					33.3	3:45		
	UMU3-N1	70.5	70.5	3:38	3:53	100	20	60	3:51	3:54	20	4.0	100	40									KS	28
12-Oct	UMU4-N8	70.5	70.5	8:26	8:39	100	20	60	8:37	8:40	20	4.1	100	40			8:29	8:46	13.3	14.3	1.1		KS	27
																				3.6	0.8			
																				5.2	-0.7			

	Roto-tiller	carbon dose per foot print		mixing time for carbon/water		flush line with water Based on martix flow rate & line length		carbon deployment per foot print			pump flow readings	velocity readings	flush line with water Based on martix flow rate & line length		mixing time per foot print		settling time per foot print		turbidity reading per foot print			foot print end time	process operator	
Date	foot print #	target	actual	Start	end	Line length Ft.	Flush Time	gallons deployed	start time	end time	GPM	FPS	Line length Ft.	Flush Time	start time	end time	start time	end time	Pre	During	Post	time	Initial	PSI
																				1.2	0.6			
																					0.9	8:46		
	UMU4-N7	70.5	70.5	8:41	8:54	100	20	60	8:52	8:55	20	4.1	100	40			8:50	8:59	23.4	18.6	5.6		KS	27
																				16.6	3.7			
																				11.7	0.1			
																				6.4	0.2			
																					-0.8	8:59		
	UMU4-N6	70.5	70.5	8:56	9:06	100	20	60	9:04	9:07	20	4.1	100	40			9:02	9:11	20.1	24.0	20.1		KS	27
																				32.7	20.4			
																				31.0	16.1			
																				26.7	10.1			
																					7.7	9:11		
	UMU4-N5	70.5	70.5	9:08	9:18	100	20	60	9:16	9:19	20	4.1	100	40			9:15	9:24	37.0	24.1	31.5		KS	27
																				36.2	23.6			
																				41.7	23.7			
																				32.3	17.0			
																					24.0	9:24		
	UMU4-N4	70.5	70.5	9:20	9:29	100	20	60	9:27	9:30	20	4.1	100	40			9:26	9:35	46.2	46.1	24.9		KS	27
																				41.2	20.0			
																				32.1	24.4			
																				34.6	26.5			
																					20.4	9:35		
	UMU4-N3	70.5	70.5	9:31	9:40	100	20	60	9:38	9:41	20	4.2	100	40			9:37	9:46	35.2	42.6	39.3		KS	27
																				40.2	33.3			
																				5.1	24.2			
																				43.7	18.6			
																					17.1	9:46		
	UMU4-N2	70.5	70.5	9:42	9:54	100	20	60	9:52	9:55	20	4.2	100	40			9:51	10:00	35.2	46.3	17.9		KS	27
																				63.1	15.4			
																				21.0	13.2			
																				30.1	13.9			
																					9.1	10:00		
	UMU4-N1	70.5	70.5	9:56	10:08	100	20	60	10:06	10:09	20	4.2	100	40			10:04	10:13	43.7	45.0	27.2		KS	27
																				37.8	23.5			
																				40.3	16.3			
																				28.4	25.5			
																					17.1	10:13		

TINE SLED PROCESS CONTROL LOGS

Alcoa ACPS Project
Process Controls for carbon Deployment
Tine Sled

	Tine-Sled test area	tine sled in Position	flush the line with water		begin pumping carbon to sled-Tine	time allowed for carbon to reach time sled	hoisting of tine-sled	tine sled speed	pump flow 1.79 Gal/Rev.	flow velocity ft/sec	Pump Flow	time allowed to flush line	unit area completions	process operator
Date	number	time	line length	flush time	time	time	time	feet/minute	revolutions/minute	Gallon/minute	Gallon/minute	Time	time	initials
27-Sep	TS-1	11:30	150	20sec	11:31	20sec	11:32	10	14.16	4.4,5	24.93	30sec	11:41	JRD
			wt of sled in water = 600 lbs											
			pull of sled per crane load = 500lbs											
			length of pull was 80' long											
			alignment varied less than 6" to 8"											
			lost 7'x10' received a 2-5 times doze (emptied tubs into last sled location)											
	TS-1	14:48	150	10sec	14:58	10sec	14:58	10 ft/min		5.55	30.5	-	-	KM
			at the 20' distance of the pull, the pull was stoped for the following reasons											
			1) only half of the carbon batch was injected											
			2) the velocity meter on the discharge pipe was reading 5-55 vs 9.05ft/s											
			3) the pump pressure was maxing out											
			4) the pump H2 setting was fluxuating from 23.661 and resetting											
			Conclusion:											
			1) the pump discharge hose was disconnected at the 50' port end was placed in 1 of the mixing tubs, the pump was restarted and the H2, and flow returned to normal											
			2) the sled was raised above the surface and recharged with water to look for problems. About 40% of the nozzels were plugged, the sled was placed in its container,											
			the cover removed and personnel in hazmat suits proceeded with cleaning the nozzels.											
28-Sep	TS2	12:20	150	20	12:55	18	12:56	5ft/min	14.16		25GPM			JRD
	Est 60'	work area 20' +/- from upstream edge to 20 +/- from DS edge									Double dose area			
					13:08		13:08			+/- 4.5				
					13:26		13:26		stopped	13:26	(kinked hose)			
					13:27		13:27							
					13:36		13:36			+/- 4.5			13:38	JRD
			* Dosed 70' total see drawing for start-stop points											

Date	Tine-Sled test area number	tine sled in Position time	flush the line with water line length	flush time	begin pumping carbon to sled-Tine time	time allowed for carbon to reach time sled time	hoisting of tine-sled time	tine sled speed feet/minute	pump flow 1.79 Gal/Rev. revolutions/minute	flow velocity ft/sec Gallon/minute	Pump Flow Gallon/minute	time allowed to flush line Time	unit area completions time	process operator initials
	TS3	14:46	150	20	14:50	18	14:51	10ft/min	14.16	+/-4-4.6/ 4.6	25GPM			
		work area start sled 2' from upstream edge of area												
			stop sled 14' from downstream edge of work area											
			pull length	79.7'										
					15:02		15:02			+/- 4.6			15:06	JRD
12-Oct	TS4	1:13	100	18	1:35	18	2:05	5'/1min	11.05	2.7	18.7	40	2:05	KS
				Length pull 30' pull and 32' pull										
										Add 4 buoys each 45lbs				
			Dist.		0/ 0.45	30 / 0.55	60 / 0.2'							
			Actual/measured		15.1 / 14.65	15.2 / 14.65	14.9 / 14.7							
	TS5	2:24	100	18	2:43	18	3:15	5'/1min	11.05	3.3	18.7	40	3:15	KS
				Length pulls 31'& 31'										
			Dist.		0 / 0.7'	30 / 0.7'	60 / 0.4'							
			Actual/measured		15.5 / 14.8	15.4 / 14.7	15 / 14.6		mounding 14.2 +/-	Add 4 buoys each 45lbs				
	TS6	3:58	100	18	4:18	18		5'/1min	11.05	3.3	18.7	1:30	4:40	KS
				Length 1st pull 31' 2nd pull 31'										
				3 buoys each front corner 0 buoy each back corner										
			Dist.		0	30	60							
			Actual/Measured		15.1 /15.1	14.95 / 15.3	14.9/15.0		LEFT SLED IN THE WATER					
13-Oct	TS7	9:35	100	18	9:50	18	10:25	5'	10.84	3.5	20	40	10:25	KS
					Length of pull 65' - 3' offset				0	30	60			
									14.9 / 15.2	15/15.2	14.5/15			
	TS8	10:47	100	18	10:56	18	11:10	5'	10.84	3.4	20	40	11:10	KS
									0	30	60			
					Length of pull 65' - 2' offset				15 / 15.5	16 / 15.2	14.9 / 15.2			
	TS9	11:30	100	18	11:45	18	11:56	5'	10.84	3.5	20	40	11:56	KS
									0	30	60			

	Tine-Sled test area	tine sled in Position	flush the line with water		begin pumping carbon to sled-Tine	time allowed for carbon to reach time sled	hoisting of tine-sled	tine sled speed	pump flow 1.79 Gal/Rev.	flow velocity ft/sec	Pump Flow	time allowed to flush line	unit area completions	process operator
Date	**number**	**time**	**line length**	**flush time**	**time**	**time**	**time**	**feet/minute**	**revolutions/minute**	**Gallon/minute**	**Gallon/minute**	**Time**	**time**	**initials**
					Length of pull 65' - 2' offset				15.1 / 15.5	15 / 15.3	15.1 / 15.3		**12 NOZZLES PLUGGED**	
	TS10	12:30	100	18	1:15	18	1:30	5'	10.84	3	20	40	1:30	KS
									0	30	60			
					Length of pull 64' - 2'				15.2 / 15.5	15 / 15.3	15.2 / 15.2			
	TS11	1:50	100	18	1:58	18	2:25	5'	10.84	3.2	20	1 min	2:25	KS
									0	30	60			
					Length of pull 64' -2'				15.2 /15.5	15.1 /15.5	15.4 /15.3			
						cleaned 20 plugged nozzles prior to starting								
						cleaned 12 plugged nozzles after TS9 pull								
						had 2 plugged nozzles after TS11 pull								

ELEVATION CORRECTION DURING TILLER APPLICATION

Table G-1
Elevation Correction During Tiller Application

Tiller Cell	(1) Baseline Survey Sediment Bed Elevation (feet)	(2) Surveyed Water Surface Elevation (feet) [1]	(3) Measured Water Depth (feet)	(4) = (2)-(3) Field Corrected Sediment Bed Elevation (feet) [1]	(5) Field Offset to Optimize Equipment (feet)	(6) = (4)-(1)+(5) Delta from Baseline Survey (feet)
Initial Testing Area [2]						
TU7-N3	139.1	155.2	15.2	140.0	0.3	1.23
TU7-N2	139.2	155.2	15.2	140.0	0.3	1.13
TU7-N1	139.3	155.2	15.2	140.0	0.3	1.03
TU8-N1	139.3	155.2	15.2	140.0	0.3	1.03
TU8-N2	139.1	155.2	15.2	140.0	0.3	1.23
TU8-N3	139.1	155.2	15.2	140.0	0.3	1.23
TU9-N3	139.1	155.2	15.1	140.1	0.3	1.33
TU9-N2	139.2	155.2	15.1	140.1	0.3	1.23
TU1-N4	139.1	155.3	15.7	139.6	0.3	0.82
TU1-N5	139.0	155.3	15.6	139.7	0.3	1.02
TU2-N4	139.0	155.3	15.6	139.7	0.3	1.02
TU2-N5	138.9	155.3	15.9	139.4	0.3	0.82
TU3-N4	139.0	155.3	15.8	139.5	0.2	0.72
TU3-N5	139.0	155.3	15.7	139.6	0.2	0.82
TU4-N4	138.9	155.3	15.6	139.7	0.2	1.02
TU4-N5	138.8	155.3	15.5	139.8	0.2	1.22
Mixed Tiller Treatment Area						
MAU1-N2	139.5	155.1	14.8	140.4	0.3	1.16
MAU1-N3	139.5	155.1	15.0	140.2	0.3	0.96
MAU1-N4	139.6	155.1	14.9	140.2	0.3	0.91
MAU1-N5	139.5	155.1	15.0	140.1	0.3	0.91
MAU1-N6	139.4	155.1	15.0	140.1	0.3	1.01
MAU1-N7	139.3	155.1	15.1	140.1	0.3	1.06
MAU1-N8	139.3	155.1	15.1	140.0	0.3	1.06
MAU1-N9	139.2	155.1	15.2	139.9	0.3	1.06
MAU1-N10	139.3	155.1	15.3	139.9	0.3	0.91
MAU1-N11	139.3	155.1	15.3	139.9	0.3	0.91
MAU2-N2	139.7	155.3	14.8	140.5	0.3	1.11
MAU2-N3	139.5	155.3	14.8	140.5	0.3	1.31
MAU2-N4	139.6	155.3	14.8	140.5	0.3	1.21
MAU2-N5	139.6	155.3	14.8	140.5	0.3	1.21
MAU2-N6	139.4	155.3	14.7	140.6	0.3	1.51
MAU2-N7	139.3	155.3	14.9	140.4	0.3	1.41
MAU2-N8	139.2	155.3	15.1	140.2	0.3	1.31
MAU2-N9	139.1	155.3	15.2	140.1	0.3	1.31
MAU2-N10	140.1	155.3	15.2	140.0	0.3	0.23
MAU2-N11	140.0	155.3	15.0	140.2	0.3	0.53
MAU3-N1 [3]	139.8	155.3	14.6	140.6	0.3	1.13
MAU3-N2	139.7	155.3	14.7	140.5	0.3	1.13
MAU3-N3	139.6	155.3	14.7	140.5	0.3	1.23
MAU3-N4	139.5	155.3	14.8	140.4	0.3	1.23
MAU3-N5	139.6	155.3	15.0	140.2	0.3	0.93

Tiller Cell	(1) Baseline Survey Sediment Bed Elevation (feet)	(2) Surveyed Water Surface Elevation (feet) [1]	(3) Measured Water Depth (feet)	(4) = (2)-(3) Field Corrected Sediment Bed Elevation (feet) [1]	(5) Field Offset to Optimize Equipment (feet)	(6) = (4)-(1)+(5) Delta from Baseline Survey (feet)
MAU3-N6	139.4	155.3	15.0	140.2	0.3	1.13
MAU3-N7	139.3	155.3	15.1	140.1	0.3	1.13
MAU3-N8	139.2	155.3	15.1	140.1	0.3	1.23
MAU3-N9	139.2	155.3	15.1	140.1	0.3	1.23
MAU3-N10	139.3	155.3	15.0	140.2	0.3	1.23
MAU3-N11	139.3	155.3	15.0	140.2	0.3	1.23
MAU4-N2	139.7	155.3	14.8	140.5	0.3	1.16
MAU4-N3	139.5	155.3	14.9	140.4	0.3	1.21
MAU4-N4	139.5	155.3	14.9	140.4	0.3	1.21
MAU4-N5	139.5	155.3	14.9	140.4	0.3	1.21
MaU4-N6	139.5	155.3	15.0	140.3	0.3	1.16
MAU4-N7	139.4	155.3	15.1	140.2	0.3	1.11
MAU4-N8	139.2	155.3	15.2	140.1	0.3	1.21
MAU4-N9	139.3	155.3	15.2	140.1	0.3	1.11
MAU4-N10	139.2	155.3	15.1	140.2	0.3	1.31
MAU4-N11	139.2	155.3	15.1	140.2	0.3	1.31
MAU5-N2	139.7	155.3	14.8	140.5	0.3	1.11
MAU5-N3	139.6	155.3	14.9	140.4	0.3	1.11
MAU5-N4	139.6	155.3	15.0	140.4	0.3	1.06
MAU5-N5	139.6	155.3	15.0	140.3	0.3	1.01
MAU5-N6	139.5	155.3	15.0	140.3	0.3	1.11
MAU5-N7	139.5	155.3	15.1	140.2	0.3	1.01
MAU5-N8	139.4	155.3	15.2	140.1	0.3	1.01
MAU5-N9	139.2	155.3	15.2	140.1	0.3	1.21
MAU5-N10	139.3	155.3	15.2	140.1	0.3	1.11
MAU5-N11	139.3	155.3	15.1	140.2	0.3	1.21
MAU6-N2	139.7	155.1	14.7	140.4	0.3	1.03
MAU6-N3	139.6	155.1	14.7	140.4	0.3	1.08
MAU6-N4	139.5	155.1	14.9	140.2	0.3	1.03
MAU6-N5	139.5	155.1	14.9	140.2	0.3	1.03
MAU6-N6	139.5	155.1	14.9	140.2	0.3	0.98
MAU6-N7	139.4	155.1	14.9	140.2	0.3	1.05
MAU6-N8	139.3	155.1	15.0	140.1	0.3	1.08
MAU6-N9	139.3	155.1	15.1	140.0	0.3	0.98
MAU6-N10	139.3	155.1	15.1	140.0	0.3	1.03
MAU6-N11	139.3	155.1	15.1	140.0	0.3	0.98
MAU7-N2	139.6	155.3	14.9	140.5	0.3	1.16
MAU7-N3	139.6	155.3	14.9	140.5	0.3	1.16
MAU7-N4	139.5	155.3	15.0	140.3	0.3	1.11
MAU7-N5	139.5	155.3	15.1	140.2	0.3	1.01
MAU7-N6	139.4	155.3	15.1	140.2	0.3	1.11
MAU7-N7	139.3	155.3	15.2	140.2	0.3	1.16
MAU7-N8	139.2	155.3	15.3	140.0	0.3	1.11
MAU7-N9	139.3	155.3	15.2	140.1	0.3	1.11
MAU7-N10	139.3	155.3	15.2	140.1	0.3	1.11
MAU7-N11	139.3	155.3	15.3	140.0	0.3	1.01

Tiller Cell	(1) Baseline Survey Sediment Bed Elevation (feet)	(2) Surveyed Water Surface Elevation (feet) [1]	(3) Measured Water Depth (feet)	(4) = (2)-(3) Field Corrected Sediment Bed Elevation (feet) [1]	(5) Field Offset to Optimize Equipment (feet)	(6) = (4)-(1)+(5) Delta from Baseline Survey (feet)
MAU8-N2	139.6	154.9	14.6	140.3	0.3	0.98
MAU8-N3	139.6	154.9	14.7	140.2	0.3	0.93
MAU8-N4	139.5	154.9	14.6	140.3	0.3	1.08
MAU8-N5	139.5	154.9	14.6	140.3	0.3	1.08
MAU8-N6	139.4	154.9	14.7	140.2	0.3	1.08
MAU8-N7	139.3	154.9	14.8	140.1	0.3	1.08
MAU8-N8	139.3	154.9	14.9	140.0	0.3	1.03
MAU8-N9	139.2	154.9	15.0	139.9	0.3	1.03
MAU8-N10	139.3	154.9	14.9	140.0	0.3	0.98
MAU8-N11	139.2	154.9	14.8	140.1	0.3	1.23
MAU9-N2	139.6	155.3	14.7	140.6	0.3	1.32
MAU9-N3	139.5	155.3	14.9	140.4	0.3	1.17
MAU9-N4	139.5	155.3	14.9	140.4	0.3	1.17
MAU9-N5	139.5	155.3	15.0	140.3	0.3	1.07
MAU9-N6	139.4	155.3	15.0	140.3	0.3	1.17
MAU9-N7	139.4	155.3	15.1	140.2	0.3	1.12
MAU9-N8	139.1	155.3	15.3	140.0	0.3	1.17
MAU9-N9	139.1	155.3	15.3	140.0	0.3	1.17
MAU9-N10	139.2	155.3	15.3	140.0	0.3	1.07
MAU9-N11	139.2	155.3	15.3	140.0	0.3	1.07
MAU10-N2	139.6	155.3	14.8	140.5	0.3	1.22
MAU10-N3	139.6	155.3	15.0	140.3	0.3	1.02
MAU10-N4	139.6	155.3	14.9	140.4	0.3	1.07
MAU10-N5	139.5	155.3	15.0	140.3	0.3	1.12
MAU10-N6	139.4	155.3	15.0	140.3	0.3	1.22
MAU10-N7	139.4	155.3	15.0	140.3	0.3	1.22
MAU10-N8	139.2	155.3	15.2	140.1	0.3	1.22
MAU10-N9	139.2	155.3	15.2	140.1	0.3	1.17
MAU10-N10	139.2	155.3	15.3	140.0	0.3	1.12
MAU10-N11	139.2	155.3	15.3	140.0	0.3	1.07
MAU11-N2	139.6	155.1	14.7	140.4	0.3	1.11
MAU11-N3	139.6	155.1	14.8	140.4	0.3	1.06
MAU11-N4	139.6	155.1	14.8	140.4	0.3	1.06
MAU11-N5	139.5	155.1	14.8	140.3	0.3	1.11
MAU11-N6	139.4	155.1	15.0	140.2	0.3	1.06
MAU11-N7	139.3	155.1	15.1	140.1	0.3	1.11
MAU11-N8	139.2	155.1	15.1	140.0	0.3	1.11
MAU11-N9	139.3	155.1	15.1	140.0	0.3	1.01
MAU11-N10	139.2	155.1	15.2	140.0	0.3	1.06
MAU11-N11	139.2	155.1	15.2	139.9	0.3	1.01
MAU12-N2	139.6	155.1	14.7	140.4	0.3	1.11
MAU12-N3	139.5	155.1	14.7	140.4	0.3	1.21
MAU12-N4	139.5	155.1	14.7	140.4	0.3	1.21
MAU12-N5	139.4	155.1	14.8	140.4	0.3	1.26
MAU12-N6	139.3	155.1	14.8	140.3	0.3	1.31
MAU12-N7	139.1	155.1	14.9	140.2	0.3	1.41

Tiller Cell	(1) Baseline Survey Sediment Bed Elevation (feet)	(2) Surveyed Water Surface Elevation (feet) [1]	(3) Measured Water Depth (feet)	(4) = (2)-(3) Field Corrected Sediment Bed Elevation (feet) [1]	(5) Field Offset to Optimize Equipment (feet)	(6) = (4)-(1)+(5) Delta from Baseline Survey (feet)
MAU12-N8	139.1	155.1	15.0	140.1	0.3	1.31
MAU12-N9	139.1	155.1	15.1	140.0	0.3	1.21
MAU12-N10	139.1	155.1	15.1	140.0	0.3	1.21
MAU12-N11	139.1	155.1	15.2	139.9	0.3	1.11
MAU13-N2	139.6	155.5	15.1	140.4	0.3	1.08
MAU13-N3	139.4	155.5	15.2	140.3	0.3	1.18
MAU13-N4	139.3	155.5	15.2	140.3	0.3	1.28
MAU13-N5	139.4	155.5	15.2	140.3	0.3	1.23
MAU13-N6	139.3	155.5	15.4	140.1	0.3	1.08
MAU13-N7	139.2	155.5	15.6	139.9	0.3	1.03
MAU13-N8	139.2	155.5	15.6	139.9	0.3	1.03
MAU13-N9	139.1	155.5	15.6	139.9	0.3	1.08
MAU13-N10	139.2	155.5	15.5	140.0	0.3	1.08
MAU13-N11	139.2	155.5	15.5	140.0	0.3	1.08
Unmixed Tiller Treatment Area						
UMU1-N1	139.7	155.3	14.7	140.6	0.3	1.24
UMU1-N2	140.0	155.3	14.9	140.4	0.3	0.79
UMU1-N3	139.6	155.3	15.0	140.3	0.3	1.04
UMU1-N4	139.6	155.3	15.0	140.3	0.3	1.04
UMU1-N5	139.5	155.3	15.2	140.1	0.3	0.99
UMU1-N6	139.2	155.3	15.3	140.0	0.3	1.14
UMU1-N7	139.1	155.3	15.4	139.9	0.3	1.14
UMU1-N8	139.0	155.3	15.5	139.8	0.3	1.14
UMU2-N1	139.7	155.3	14.6	140.7	0.3	1.34
UMU2-N2	139.6	155.3	14.8	140.5	0.3	1.29
UMU2-N3	139.4	155.3	15.0	140.3	0.3	1.24
UMU2-N4	139.3	155.3	15.0	140.3	0.3	1.34
UMU2-N5	139.2	155.3	15.2	140.1	0.3	1.24
UMU2-N6	139.1	155.3	15.2	140.1	0.3	1.34
UMU2-N7	139.0	155.3	15.4	139.9	0.3	1.29
UMU2-N8	138.9	155.3	15.5	139.8	0.3	1.24
UMU3-N1	139.8	155.3	14.7	140.6	0.3	1.14
UMU3-N2	139.7	155.3	14.8	140.5	0.3	1.14
UMU3-N3	139.6	155.3	14.9	140.4	0.3	1.19
UMU3-N4	139.3	155.3	15.0	140.3	0.3	1.34
UMU3-N5	139.4	155.3	15.1	140.2	0.3	1.19
UMU3-N6	139.2	155.3	15.2	140.1	0.3	1.24
UMU3-N7	139.0	155.3	15.4	139.9	0.3	1.24
UMU3-N8	139.0	155.3	15.4	139.9	0.3	1.29
UMU4-N1	139.8	154.9	14.7	140.2	0.3	0.72
UMU4-N2	139.7	154.9	14.6	140.3	0.3	0.92
UMU4-N3	139.7	154.9	14.7	140.2	0.3	0.87
UMU4-N4	139.5	154.9	14.9	140.1	0.3	0.92
UMU4-N5	139.4	154.9	15.0	139.9	0.3	0.87
UMU4-N6	139.2	154.9	15.3	139.6	0.3	0.72
UMU4-N7	139.2	154.9	15.2	139.7	0.3	0.82

Tiller Cell	(1) Baseline Survey Sediment Bed Elevation (feet)	(2) Surveyed Water Surface Elevation (feet) [1]	(3) Measured Water Depth (feet)	(4) = (2)-(3) Field Corrected Sediment Bed Elevation (feet) [1]	(5) Field Offset to Optimize Equipment (feet)	(6) = (4)-(1)+(5) Delta from Baseline Survey (feet)
UMU4-N8	139.0	154.9	15.3	139.6	0.3	0.92

Notes:

1. Elevations based on United States Lakes Survey (USLS) 1935.
2. Elevation correction was not applied during the initial stages of construction in the Initial Testing Area (first 18 cells) as it was the data from these cells that was used to determine that corrections were necessary.
3. Correction was determined, but no carbon was placed in this cell.

APPENDIX H

ACPS VIDEO DOCUMENTATION

(on included DVD)

ELECTRONIC RECORD TARGET SHEET

SITE NAME:	ALCOA AGGREGATION SITE
CERCLIS ID:	NYD980506232
SDMS DOC ID:	113231
ALT. MEDIA TYPE:	DVD
DOCUMENT FORMAT:	VIDEO
NATIVE FORMAT LOCATION/FILENAME:	ACPS UNDERWATER VIDEO (D:)
COMMENTS:	VIDEO IS ON DVD AND CAN BE REVIEWED IN THE SUPERFUND RECORDS CENTER, 290 BROADWAY, 18TH FLOOR, NYC 10007